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Electronic Reliability

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BATTELLE TECHNICAL REVIEW

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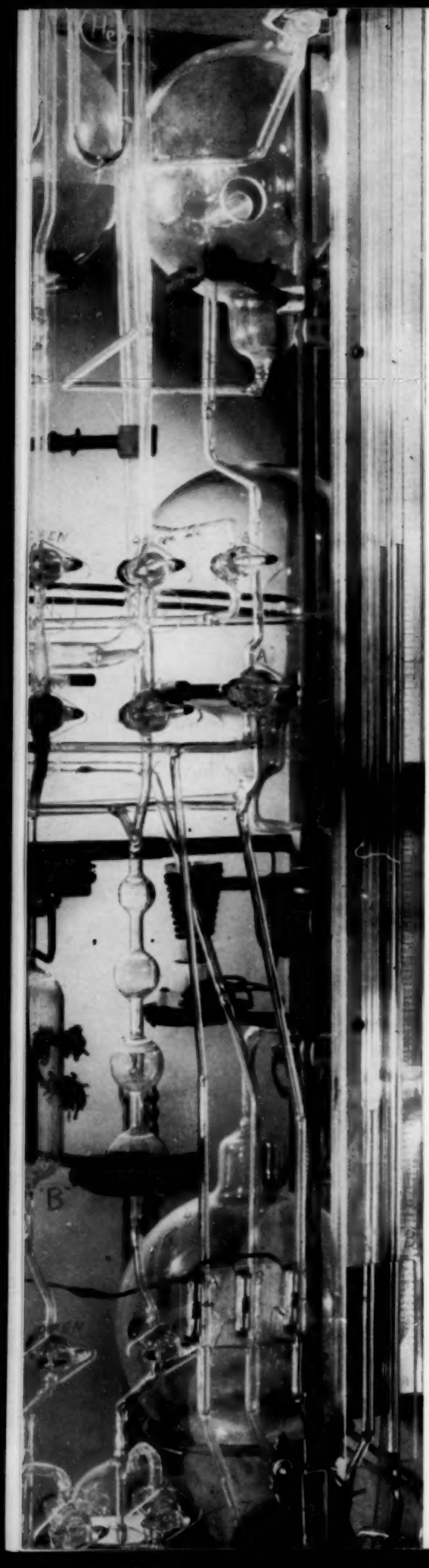

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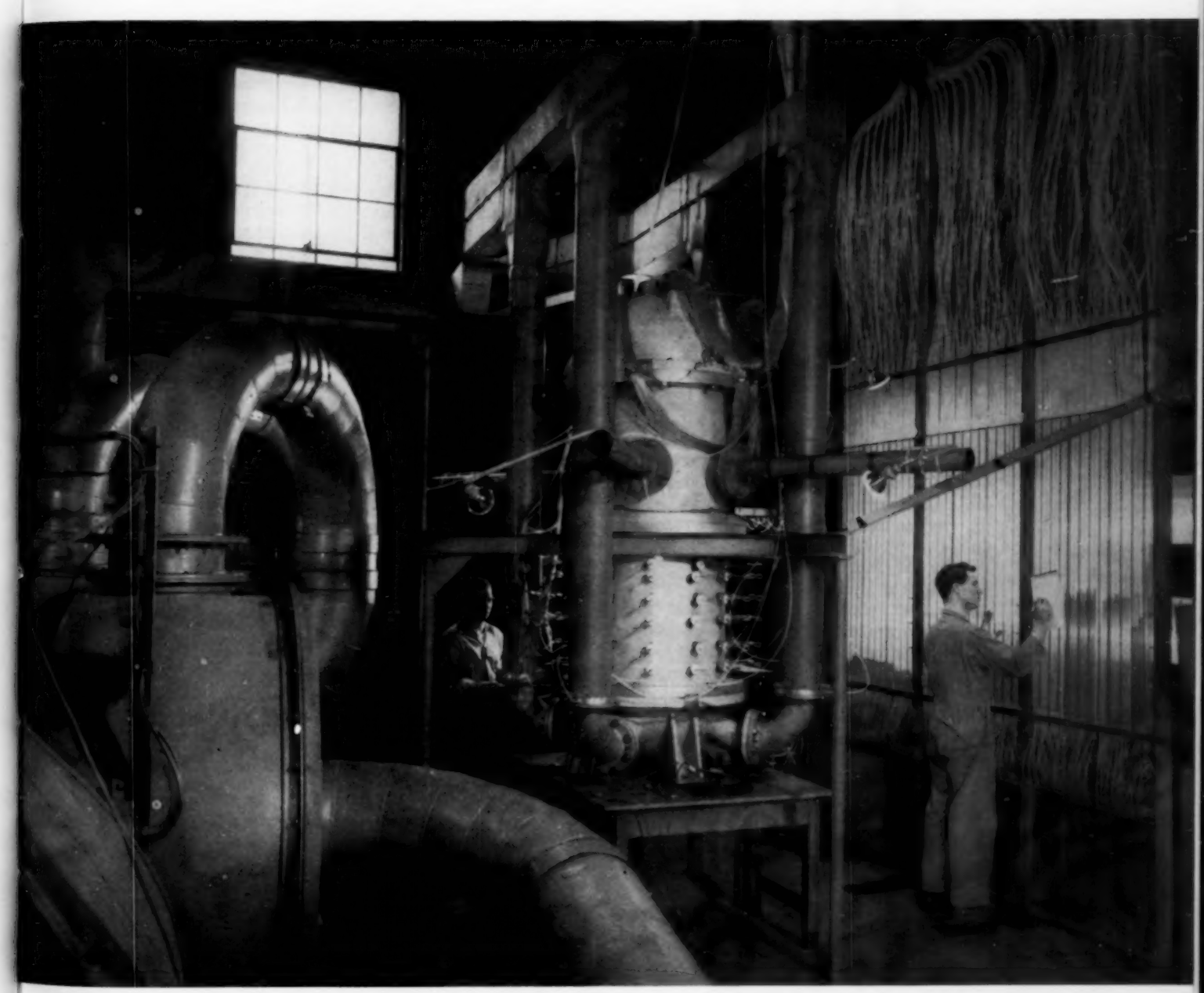
83a Battelle Technical Review Abstracts

Abstracts of articles and papers in a wide variety of technological fields from more than 1350 journals published throughout the world. Abstract selection largely reflects the primary areas of Battelle research.

Adsorption apparatus used to determine surface area, porosity, and adsorption characteristics of solids.

An internal-flow study in progress on the quarter-scale model of the 60,000-kw Shippingport reactor. The reactor, for which the Westinghouse Electric Corporation is prime contractor, will be the first in the United States for large-scale commercial generation of electric power. Constructed for the Atomic Energy Commission, it will be one part of an electric power facility of which the Duquesne Light Company is building the electric generating portion. Such a flow study, carried on by Battelle technologists with cooperation of Westinghouse personnel, requires special equipment. Four large blowers supply six pounds of air per second at 5.5 psi. On the unique manometer board at the right, with 350 plastic tubes, pressures to 15 feet of water can be read at eye level.



REACTOR FLOW STUDY

VIGNETTE

COMPUTATIONAL ENGINEER

JACK BELZER

The analytical approach to research, utilizing computers, is an effective means of attacking two growing problems—the increasing cost of experimental research and the increasing difficulty of getting timely data required for a research program. Jack Belzer, of Battelle's digital computing laboratory, believes that high-speed computers have become an absolute necessity in many research fields. Through simulation of experiments, he points out, they can provide technologists with data in a few days which might take months of experimental work to gather, or which might be virtually impossible to gain through experimentation.

Since joining Battelle in 1952, Jack has been in a key position to watch and contribute to the growing use of computers. In the Institute, the computer laboratory is now used by all of its research groups, and the breadth of its capabilities is reflected in the areas in which Jack has helped solve problems. These areas have included: preparation of air-speed tables; weapons analysis; studies of reactor operations; design studies of equipment; fatigue studies of materials; reliability studies; stress analyses; conductivity of materials; aircraft design; economic studies; and statistical studies in many fields.

After receiving his B.S. degree in electrical engineering at Cooper Union, Jack gained his first extensive experience with computers at the United States Naval Observatory. While there he not only devised new techniques for scientific computations by punched cards, but also planned and prepared the first *Air Almanac* published in the United States. It is now widely used by navigators in the air and on the sea.

Later he moved to The Ohio State University where he helped set up that institution's first computational laboratory and also directed it. He also undertook an educational program to provide training for personnel as well as to make known the potentialities of computer facilities. Under his guidance, the computing center was used by an ever-widening number of departments.

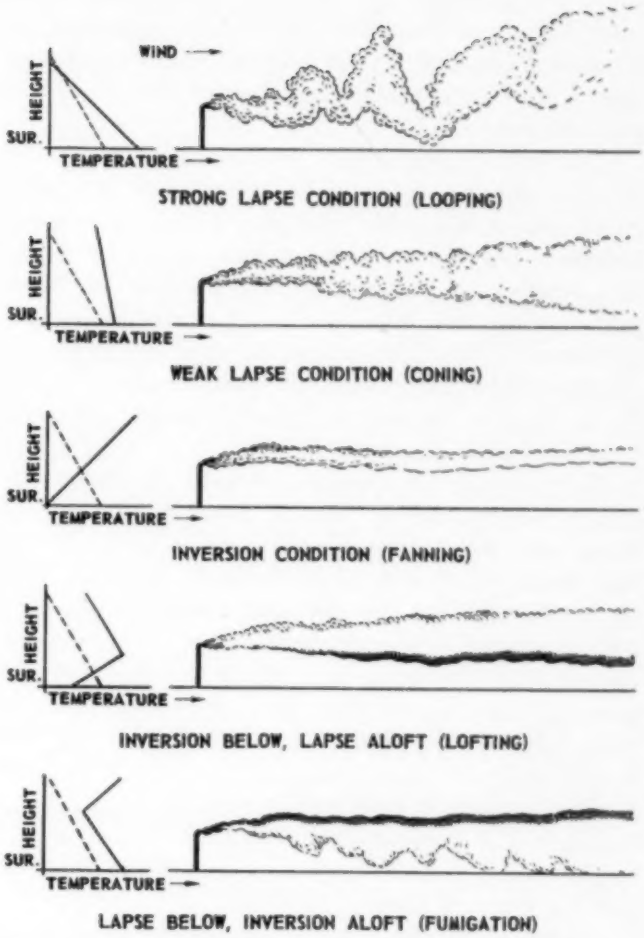
His computational work has given Jack broad interests. Thus, his publications have been concerned with such problems as the dynamics of galaxies, the thermodynamic properties of gases, Planck-Einstein oscillator tables, air speed tables, and pore-size distributions from gas adsorption data, as well as with computational techniques and facilities. He is a member of the American Astronomical Society, the Association for Computing Machinery, the American Mathematical Association, and the Central Ohio Association for Computing Machinery.

Church work, chess, and his home occupy much of Jack's leisure time. However, both Jack and his wife "Sugar" (her maiden name) are kept busy by their ten-year-old son's activities.

Meteorology for Industry

Meteorology is becoming increasingly important to industry for aid in such problems as site selection and construction of industrial plants. In the future, meteorological research may help man gain greater control of climate and assure more comfortable living conditons.

by Richard A. Duffee



1: *Pictorial representation of stack gas behavior under various conditions of vertical stability. Dashed line represents dry adiabatic lapse rate.*

Meteorology is commonly understood to be synonymous with weather, and a meteorologist is thought of as one who, through the application of scientific principles, considerable experience, and a crystal ball, can sometimes accurately predict the weather. Actually, meteorology, a member of the earth sciences, may be considered as that branch of physics which studies the thermodynamic machine known as the atmosphere. It is primarily concerned with the interrelationships and interactions of atmospheric properties, and with forecasting atmospheric phenomena.

Since man must exist in the atmosphere, he is vitally concerned with atmospheric conditions at any particular time and with utilizing the whimsies of weather to his own advantage. In his earliest days, man was completely dependent on climate. A history of climatic changes coincides to a great degree with a history of the development of civilizations and man's adaptation to his environment.

Although study of meteorology is over 2000 years old, its modern development stemming from invention of the thermometer and barometer did not get into full swing until World War I. At present, meteorology is concerned with three classes of activities: (1) the forecasting of atmospheric conditions; (2) the use and interpretation of climatological data: and (3) the application of meteorological principles and data to the natural sciences.

The common, well-known uses of meteorological information are in weather forecasting for the average man's use in planning his activities. Systematic use of such data is made in agriculture and in transportation, particularly shipping and air transportation. This article will be principally concerned with other, less well-known but extremely important, industrial and scientific uses such as in the selection and utilization of plant sites.

Common Uses of Weather Forecasts

The agricultural field is, of course, vitally interested in temperatures, damaging winds, precipitation, and

frost. Retail merchandising likewise is dependent on advance knowledge of precipitation, temperatures, and high winds for use in planning sales and for stock-planning purposes.

Forecasts of precipitation, winds, temperatures, and freezing rain for concrete and steel work can often effect savings of material and labor in the construction industry. The uses of weather information for safety and economical purposes in the shipping or transportation industry are obvious, especially for perishable items. The information required by these industries is available in standard forecasts issued by the U. S. Weather Bureau or through private meteorological consulting services.

The demands of aviation are more stringent. Accurate information on clouds, amounts, heights of bases and tops, surface and flight altitude winds, turbulence, icing types and amounts, visibility, precipitation, and the location and severity of thunderstorms has led to the development of meteorological networks, both military and civilian, for aviation purposes. A pilot now departs on a flight with accurate knowledge of weather conditions along his route. This is given either by an oral briefing or by a pictorial flight folder, or by both. The illustration on page 5 is a sketch of a hypothetical flight folder that a pilot might receive prior to departing on a flight from Columbus, Ohio, to Denver, Colorado.

The letters Ac, Sc, Cb, Ci, etc., stand for the types of clouds which would be encountered along the route, and the fractions to the left of these symbols denote the relative amount of sky covered by these cloud types. The symbols shown within the clouds represent icing and turbulence conditions which might be expected.

The solid curve shown descending to the ground west of Peoria represents a cold front moving from west to east. The zero degree (centigrade) isotherm shows the height above which freezing conditions may be encountered along the route.

Engineering Applications

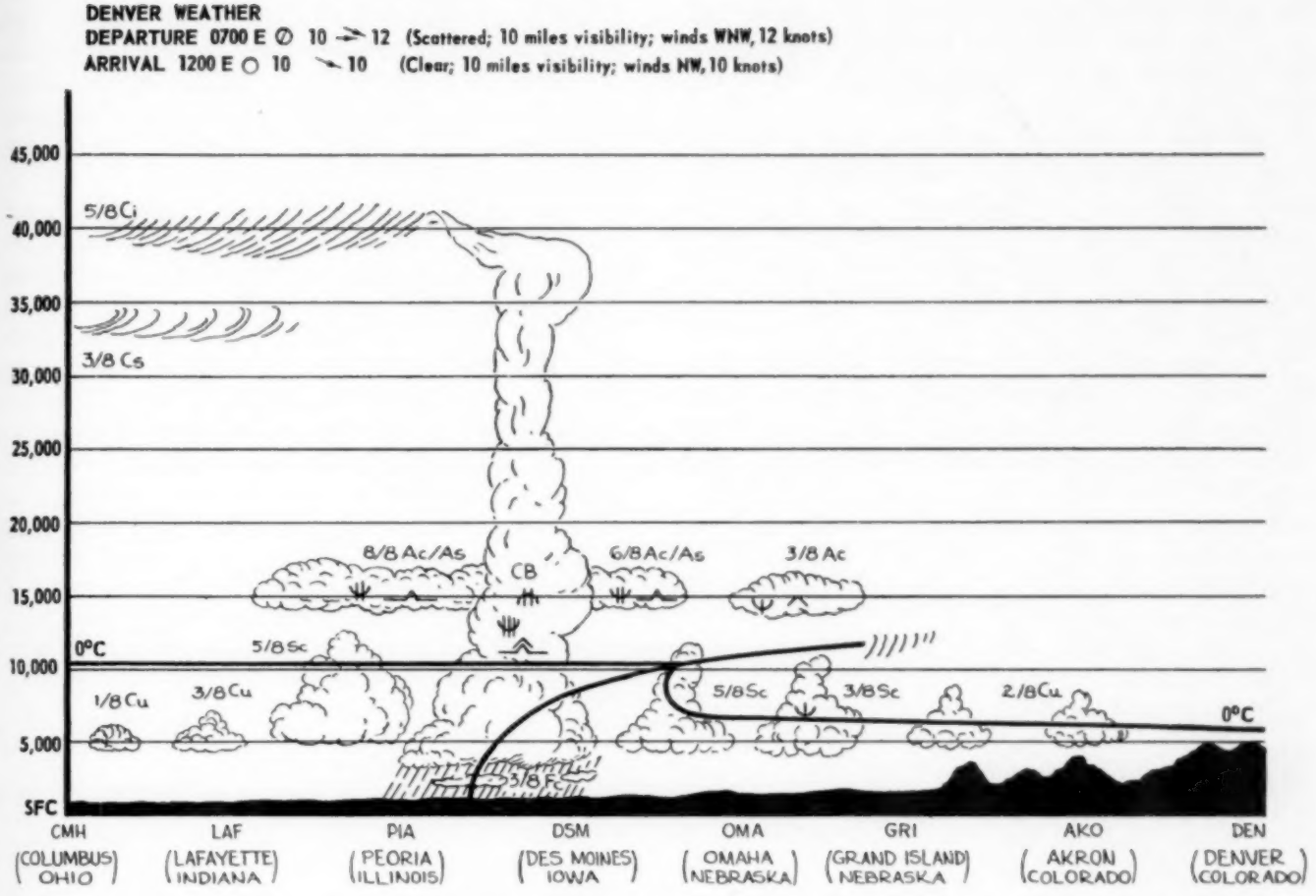
One of the most interesting and challenging fields of meteorological service is concerned with site selection, engineering design, and air pollution which embodies both forecasting techniques and climatological surveys. This is especially applicable now that atomic energy is being utilized as a source of power. These applications are now so important that some of the larger chemical and construction companies have formed their own meteorology departments.

The meteorological aspects should be among the first things considered in selecting a site. Ideally, if the location for a new facility were to be selected solely on the basis of atmospheric conditions, a meteorologist could select a climate suitable for construction, economical design and operation, living conditions, and atmospheric dispersion of pollutants. However, if the selection of the site is confined to relatively narrow limits, as is usually true, a meteorological survey can lead to the maximum utilization of favorable conditions. The simplest method of combating air-pollution problems is to prevent their formation. A meteorological survey, consisting of a climatological study and also measurements of terrain effects, for an area or city is of invaluable aid in this respect. Using the information gathered from such a survey, cities may be so zoned for industries that excessive atmospheric contamination in populated areas is unlikely.

Most of the information necessary for preliminary site selection and basic engineering design is contained in the large body of climatological data available through the U. S. Weather Bureau. At present, there are some 12,000 observing stations in this country and most of them are under supervision of the U. S. Weather Bureau. These data are generally expressed in terms of averages (means or normals) and extremes of meteorological parameters. However, terrain, especially in mountainous country or near large bodies of water, can cause considerable differences in weather conditions over a small area. Therefore, in evaluating climatological data for final site selection and structural design, a meteorological program at the structure site is necessary for evaluating terrain effects and in obtaining special information not contained in climatological tables, e.g., freeze-thaw cycles. This program is especially important for structures with critical operational specifications or for plants emitting an effluent to the atmosphere.

When the facility to be constructed is a plant emitting an effluent, site meteorology must be known, especially vertical wind and air-temperature gradients. In addition to wind conditions, the behavior of stack

The author recently joined Battelle after serving as weather officer at Wright Patterson Air Force Base, where he was responsible for flight forecasting. He is currently engaged at Battelle in meteorological studies relating to site selection, plant construction, and pollution problems. His professional training included work for a B.S. degree in chemistry which he received from Boston College and a B.S. in meteorology from Pennsylvania State University.



2. *Hypothetical weather picture from Columbus, Ohio to Denver, Colorado, as presented with a standard flight folder.*

plumes is largely regulated by the vertical temperature gradient known simply as the "lapse rate", which is a measure of the stability of the atmosphere. With regard to atmospheric stability, there are four common lapse rate types. They are: (1) isothermal, where there is essentially no change of temperature with height; (2) inversion, where the air temperature increases with height (both of these lapse rates are associated with a stable atmosphere); (3) dry adiabatic, which is that atmospheric state in which a parcel of air, displaced from one level to another, maintains the same density as its environment provided no heat is being supplied or withdrawn. This lapse rate is equal to a decrease of temperature with height of 5.4° F per 1000 feet and is associated with so-called "neutral" stability; and (4) superadiabatic lapse rate, where the temperature decrease with height exceeds the dry adiabatic rate, producing an unstable atmosphere.

The sketches on page 3 show schematic representations of stack plume behavior with five different plume behavior temperature profiles.

Measurements, at the site, of the meteorological elements that affect the diffusion powers of the atmosphere give data for theoretical calculations of stack height for minimum ground concentrations of stack effluent under specified conditions. In the case of an atomic plant, these data would provide the basis for curtailing plant operations during atmospheric conditions which are expected to produce excessive ground concentrations of contaminants.

In summation, a meteorological program such as outlined above is invaluable in selecting a site for maximum utilization of favorable conditions, especially with regard to atmospheric dispersion of effluents so as to prevent air pollution before it is a problem; in structural design for computing wind loads and other stress factors, in computing minimum stack heights; and in forecasting site weather conditions for the most economical construction program.

Applications to the Natural Sciences

The third general category of meteorological applications is related to all of the natural sciences, since the meteorological elements such as temperature, pressure, and humidity have some effect on all physical and chemical processes. These fields, though not under

the specific domain of meteorology, are extremely useful and also relatively new. As mentioned earlier, only two of these fields, hydrometeorology and bioclimatology, will be discussed.

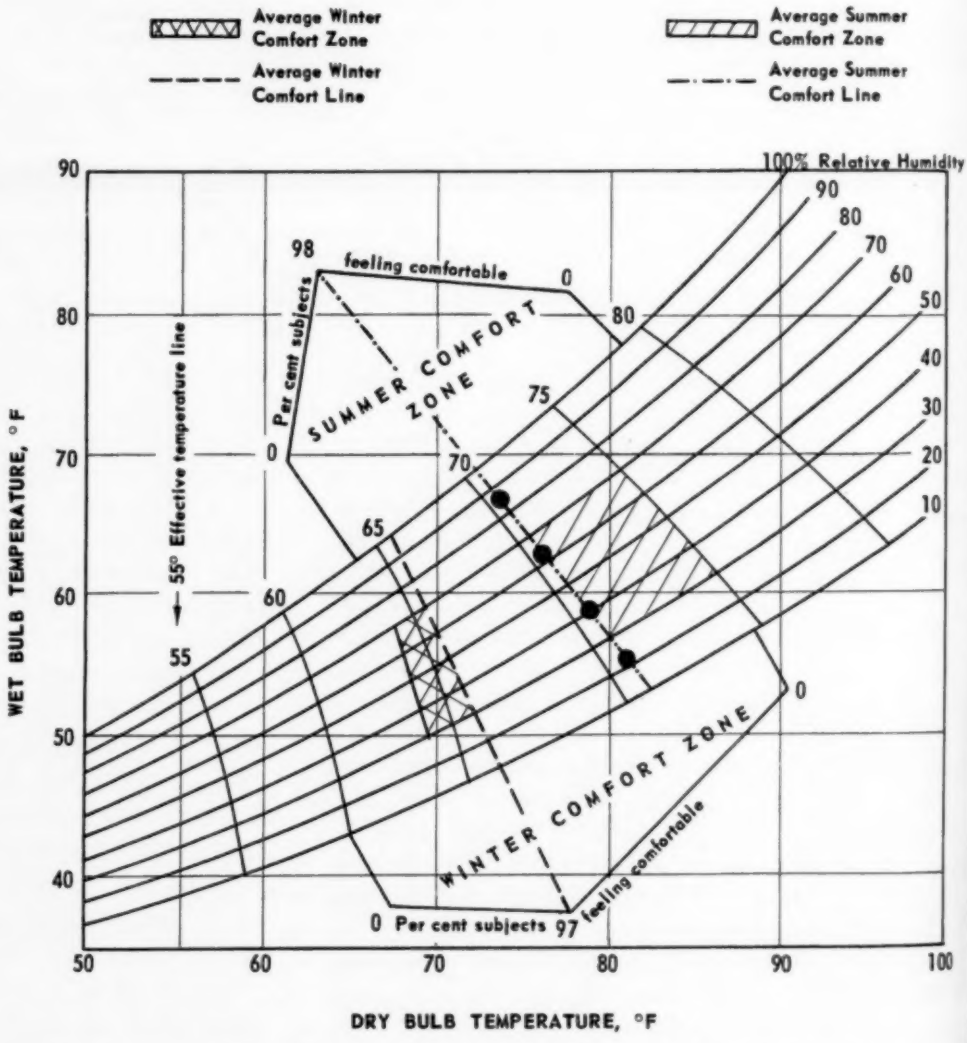
Hydrology is defined in the *Handbook of Meteorology* of the American Geophysical Union as that field which "deals with the distribution and disposal of precipitation on the land areas of the earth and, as such, is a borderline science of interest to agronomists, engineers, foresters, meteorologists, soil technicians, geologists, and others".

Hydrometeorology is therefore a combination of specialized meteorology and hydrology concerned with solving problems for which neither science is sufficient. The chief projects of hydrometeorology are involved with flood control, hydroelectric power development, navigation, irrigation, drainage, domestic and industrial water supply, and recreation.

In the development of the water resources of a region, such as the Tennessee Valley Authority, hydrometeorology plays a highly important role in the planning, design, construction, and operational phases. Meteorology provides the necessary information concerning the maximum and minimum annual, seasonal storm rainfall that might be expected over the area in question. From this information, the volumes of water available for use and also for which the reservoirs are to be designed for adequate flood control can be determined. With the national trend to further development of the river systems of the United States, more and more emphasis is being placed on the use of hydrometeorology for achieving maximum control conservation and use of water.

The second borderline field of meteorology, i.e., bioclimatology, is most closely associated with medicine or, as is implied by its name, with the biological sciences as they apply to human comfort. This is a relatively new field, requiring the specialized skills in meteorology, biochemistry, medicine, psychiatry, and engineering. The mental, physical, and emotional effects of the meteorological elements are the interests of this science.

Although the results of exposure to the extremes of solar radiation, temperature, pressure, humidity, and wind are obvious, until recently the effects produced by relatively small fluctuations in these elements have not been considered. What studies have been made have produced some rather astounding findings. For example, a single one-hour exposure to sunlight produces measurable changes in the color of a person's skin for a period exceeding seven months' duration. As for emotional effects of atmospheric conditions, the depressing effects of overcast, rainy days are apparent to all of us, as is evidenced by the adjectives "dreary"



3. *Temperature and humidity conditions for producing optimum comfort for human beings indoors in the United States. The chart is based upon exposures for periods of more than three hours in standard housing where convective type heating systems are used.* (Courtesy of American Society of Heating and Air Conditioning Engineers)

and "dismal" as applied to this type of weather. Although it may not be statistically significant, the United States city with the highest frequency of overcast and rainy days also is the possessor of the greatest suicide rate.

The American Society of Heating and Air Conditioning Engineers has conducted detailed studies on human comfort conditions based on the heat loss of the body, which must lose approximately 1 mcal/cm²-sec. at rest and 7 mcal/cm²-sec. during periods of exertion. The meteorological elements most responsible for climatic comfort as a function of bodily heat loss are temperature, humidity, wind speed, and radiation intensity. Since radiation intensity is not extensively measured, comfort conditions are generally expressed in terms of the other variables. The results of the above-mentioned study are expressed in the graph on page 6.

In this figure, humidity is expressed in terms of wet-bulb temperature and relative humidity. The results shown in this figure are self-explanatory and primarily applicable to indoor climates. Such studies have already produced rather comfortable indoor atmospheres through air-conditioning installation. However, air conditioning considers only temperature, humidity, and dustiness (including pollen) as parameters that control human comfort. Further detailed subjective studies of the effects of small variation in pressure, radiation wavelengths, ionization, ozone, or oxygen content of the air may eventually bring about the realization of an indoor atmosphere reminiscent of the invigorating atmosphere we experience on mountains or after some thunderstorms.

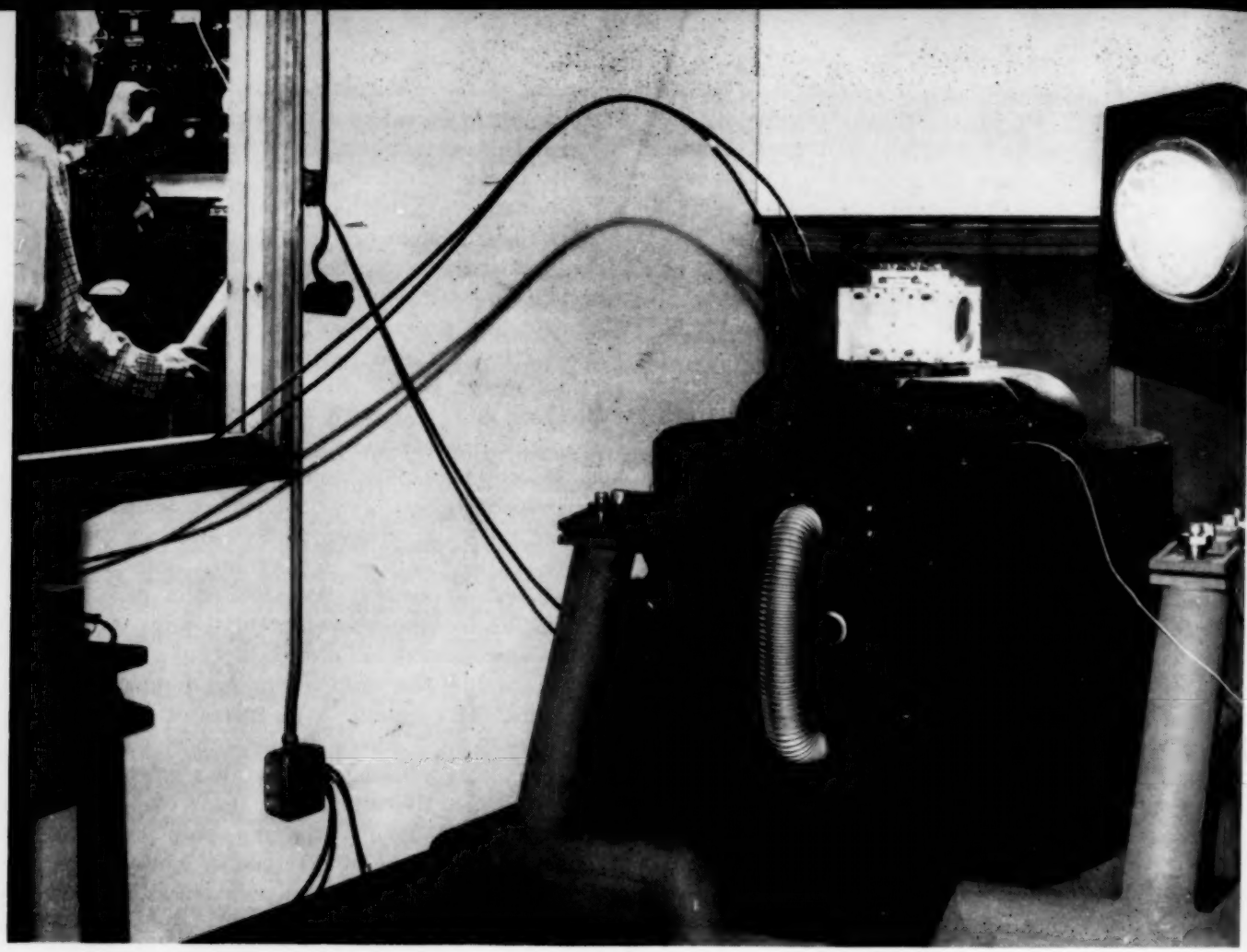
Discussing indoor climate control leads us into the much more complex problem of outdoor weather modification and control. Because of the lack of fundamental knowledge of the basic controlling forces of climate, little progress has been made along these lines though some studies have been pursued. The most familiar work of this nature has been cloud-seeding to produce rain. Although the introduction of hygroscopic nuclei into the atmosphere does increase the likelihood that a given cloud will produce rain, responsible scientists have shown that the economic possibilities of rain-making have been greatly exaggerated.

As a young science, meteorology is in need of a great deal of research, both basic and applied. The mechanics of atmospheric circulation are not as yet clearly understood and new theoretical approaches for understanding the basic controlling forces of our climate are still required. With increased knowledge of the fundamental forces of the atmosphere, weather forecasts may someday be accurate for years in advance. When the ultimate controls of weather are clearly understood, man, through applied research and engineering, will be able to control both indoor and outdoor climates to suit his own purposes. Custom-made climates for all!

SCIENCE AND RELIGION

Today's scientific and religious leaders generally understand and appreciate one another's viewpoints in their respective fields. The idea that there is any fundamental conflict has largely disappeared, except among those who try to pit their grandfathers' concepts of religion against their mistaken ideas of what science really is. Science is basically not an arrogant master which tells us what we must believe, but rather a modest servant which offers us limited help in its particular field, but leaves plenty of room for help in other fields.

Robert E. Wilson
Chairman of the Board
Standard Oil Company
(Indiana)



The electromechanical vibrator is useful in evaluating any kind of electronic and mechanical components of relatively small size. Here it is being utilized to check for erratic operation in diodes that results from vibration. The strobe light is synchronized with the motion of the vibrator to freeze the objects being evaluated for observation. Vibration environments may be recorded on tape and reproduced in the equipment.

ELECTRONIC RELIABILITY

by KENNETH E. COCHRAN

Reliability is a critical problem in the field of electronic engineering. Research in reliability problems can be helpful in increasing safety of, providing better service from, and reducing maintenance costs of electronic components and equipment.

THINKING IN TERMS OF RELIABILITY is far from new. For years, designers, engineers, and others have been concerned with safety, dependability, or long trouble-free life of many mechanisms and structures. This has been true in such fields as bridge building, automotive and appliance manufacture, railroading, and aircraft manufacture and operation. Reliability is now a critical problem in the field of electronic engineering; therefore, most of the discussion in this article will be in that area. The points illustrated for electronic reliability could just as well apply to reliability engineering of mechanical, hydraulic, or other combinations of systems.

There have been many definitions for reliability. The most common definition is based upon the length of time a part or system will operate without failure. Failure rates are usually expressed as failures per unit of time. A failure rate of less than one per cent per

1000 hours means that one item will operate for 1000 hours without failure, or that 1000 items will operate for one hour without failure. This concept is used to design experiments to establish the reliability of components and systems.

The subject of electronic reliability is receiving special attention in connection with military requirements. Today's aircraft speeds, along with other operational factors, make it necessary to supplement human capabilities with electronic and mechanical systems of great complexity. Human safety and the accomplishment of critical tasks require guaranteed operation of the systems—a certainty which may be increased, in the case of planes, by adjustments which the pilot can make. In the case of pilotless craft and guided missiles, however, the concept of guaranteed operation is even more important because no corrective action can be taken if a malfunction occurs.

A hypothetical guidance system, including both the ground checkout and control equipment and the flight control systems, can illustrate the electronic reliability problem. The whole system is usually made more complicated by the inclusion of a computer. The system may contain 20,000 or more electron tubes or transistors with their associated components. If we suppose that the total control period is one hour, then a total of 20,000 hours of guaranteed tube or transistor life is needed for successful operation. This amounts to a failure rate of less than .005 per cent per hour or a reliability greater than 99.995 per cent. Though tubes and transistors are considered reliable for many applications, failure rates of this small magnitude appear to be almost impossible to achieve. This example may illustrate, in a brief way, why the reliability problem seems to be getting more serious as the systems become more complex.

The problem of electronic reliability cannot be tackled by considering components alone. It must be taken into account at every step between design and final use. Four major areas can be considered, namely: (1) design, (2) raw materials and component procurement, (3) manufacturing and inspection, and (4) use and maintenance.

Design

Reliability starts with a good design. Usually the best design is the simplest that will satisfactorily perform the desired function. When necessary, redundancy, or parallel operation of components and systems, may be used where the operation is critical. Such redundancy, though it may complicate the design, is desirable if it assures greater reliability. However, redundancy should not be used to compensate for a poor design.

Electrical properties are only one aspect of electronic reliability. Mechanical and environmental stresses also play an extremely important role in determining how an electronic system will operate. Therefore, the designer has the obligation of taking these stresses into consideration when planning a system.

All possible details of the environment deserve consideration. Thus, if the electronic system is to be applied in a missile, the following stresses are of concern to the designer: (1) up to several hundred hours of ground checkout and stand-by operation in any climate from tropical to arctic; (2) initial shock of firing or launching; and (3) rapid changes in temperature and pressure simultaneous with severe vibration and shock conditions during flight. The magnitude and duration of many of the stresses may be largely unknown, either because they cannot be measured or because the design is in advance of good information regarding the environment.

In designing a system, engineers have the responsibility of utilizing all data about the effects of environment upon components and materials. Unfortunately most of the data on components that were incorporated into the design are likely to be on single environments rather than upon the combined or simultaneous environments that are likely to be encountered. In addition to the environmental data to be considered, designers also should take into account the interactions between components while they are in specific environments. These may be chemical or mechanical interactions, particularly when nuclear energy is involved—an area of use that is becoming increasingly important.

Unfortunately, the designer is often required to plan his system before any great amount of environmental

The author, now responsible for reliability engineering research at Battelle, has been associated with electronics investigations since joining the Institute in 1946. His studies have included fundamental measurements of semiconductors, development of various solid state devices such as rectifiers, resistors, and diodes, the tropical reliability of various components. Currently he is directing reliability investigations connected with all types of components. Earlier he was an engineer with the Universal Electric Company. He received his degree of Bachelor of Electrical Engineering from The Ohio State University.

information is available. What then can he do? Naturally he will utilize whatever environmental data can be gathered. One of the rules which is basic to his task is: Use only components and materials of proved or known capabilities. A second rule is: Design on the basis of the fewest possible components in the simplest circuit that will perform the function. After beginning his work on these lines, the designer will take steps to see that the various components and materials receive environmental evaluation at the earliest possible moment.

Another important element in designing electronic systems is the establishment of safety factors. By this is meant determining the amount of variation that is allowable before a malfunction occurs. Thus, if components being used have a 5 per cent variation in their parameters, the designer can provide a safety factor of 3 by designing the circuit to allow for a 15 per cent variation. This is similar to the common practice of using safety factors in designing structures, such as bridges.

Proper procurement practices can play an important part in providing data for the design. These will be discussed in the next section.

Raw Materials and Component Procurement

Electronic components and other small parts are, in a sense, the "raw materials" or building blocks of a system. In this sense, materials and components can be grouped as a single procurement problem.

Specifications or "yardsticks" are required for effective procurement policies. These are usually best worked out by the design and engineering groups in cooperation with the procurement group. Great care should be taken to check every pertinent aspect which could affect reliability. At the same time, no inspection procedure is acceptable if it will damage or shorten the life of the materials. Handling should be done only in ways that are known to cause no degradation. Subtle factors, such as storage cleanliness and storage environment, are also worthy of being taken into account. Frequent changes in the incoming procedures may be necessary as additional factors are found to have an effect on quality.

In general, it is good practice to specify the material or component known to do the job best. Also, whenever possible, only known or proven components and materials should be specified. Each "new" item leads to additional work to prove its ability to do the job as well as its reliability. Striving for reliability usually adds expense, but reliability cannot be purchased. The most expensive item is not necessarily the best for a particular application. Close cooperation with the supplier is a must. In many cases, a sharing of information, which was previously considered proprietary, is necessary to achieve the reliability levels desired in materials and components. It is desirable that the supplier be told as much as possible about the planned application so that he can exercise the best judgment in his processing, quality control, and handling procedures.

Load-life effects, failure rates, and other technical information will be needed as part of procurement. For example, a typical resistor might contain ceramics, metals, carbon film, and a protective organic or inorganic coating. All of these materials must be compatible in the expected environment. Determining how they will interact in an environment and how reliable they will be may require a load-life or environmental test of several hundred to 1000 hours. Such data, which are useful to and are usually determined by the designers and engineers, can also be used by the procurement group.

Careful records are a must. Seemingly unimportant items can have large effects on reliability. It is vital that these records make it possible to trace failures—even in the field—back to the steps or observations prior to and during manufacture. By this continuous feed-back of data it should be possible to continuously increase reliability.

Manufacturing and Inspection

During manufacture and inspection, everything known about the materials, components, and the design should be utilized to control the processing so as to achieve the greatest reliability.

Inspections will undoubtedly be necessary at various steps in the manufacturing operation. In many cases, an inspection is performed between each step to increase reliability. Any in-process inspections are necessarily nondestructive, and they must not shorten the life of the materials and components by stressing them almost to breakdown. Early failure of the finished system would be a likely result.

All operations should be strictly according to specifications set up for the particular application and not left to the discretion of production workers. It is best to record any deviations. Usual practice is to make the specifications as tight as feasible. However, this tightening has to be realistic and not set up barriers having no technical foundation.

Careful consideration is always given to minor details. Handling is important. Thus, any components or subassemblies that are badly jarred or dropped on the floor may be subjected to damaging shock forces. Simple lead bending or soldering operations can cause points which will be weak under vibrational forces.

Cleanliness is essential and may be assured by utilizing lint-free clothing, air conditioning, dust-collecting floor coverings, gloves, and other devices.

Use and Maintenance

An important part of over-all reliability is proper use and maintenance of equipment. Each system is usually designed for a specific purpose. The design also includes specifications on check out, proper use, storage, transportation, and maintenance of the equipment. It is essential that these be followed closely.

Properly trained personnel are needed for operation and maintenance. As far as possible, the original design usually includes provisions for the greatest ease of use and servicing. Personnel trained specifically for handling a system will be able to utilize it to the maximum extent. In addition, well-kept servicing and failure records are a basic part of both personnel training and maintenance. By using proper feedback of field operational and failure information, over-all reliability can be improved.

Steps That Can be Taken to Improve Reliability

The above discussion illustrates many of the details involved in achieving high reliability of a piece of equipment. Obviously, it may not be possible to cover all of these items in detail for any one system for reasons of time, money, manpower, or equipment. In some instances, relatively long, research-type studies are required to develop the desired data. The accumulation of failure-rate data on various environments based on several thousand hours of evaluation is an example of this type of study.

There are major steps which might be taken to achieve or improve immediate reliability. These could be done simultaneously as part of many of the reliability studies presently going on for particular systems. Aside from immediate information, these steps would provide data useful as a base line for considering reliability in the future. The major steps are:

(1) To organize reliability groups in companies where reliability must be considered. Almost all companies concerned with electronics, aircraft, and missiles are included in this class. Such groups will operate most effectively if they represent management and all major operating groups, such as engineering and design, procurement, manufacturing, and quality control. Any type of organization is suitable as long as it accomplishes (1) education of everyone concerned with reliability problems, (2) trouble shooting in specific areas to improve reliability, and (3) use of all of the in-plant and field data to feed back information for better reliability in the form of specifications, failure analyses, handling procedures, and design features. It is extremely important that close liaison within a company and with all suppliers and customers be maintained to provide continuous reliability efforts at every level—raw materials, components, parts, subsystems, systems, and whole equipments composed of many systems.

(2) To have a common information pool or center set up for reliability data. At present, countless companies in the aircraft, missile, electronic, and business machine field are developing reliability data as part of their government contracts. Each of these is forced to operate relatively independently. Their personnel must obtain up-to-date information on other contracts pertinent to theirs by extensive travel and by use of existing report-sharing facilities. As a result, data or information that could have been useful are often received too late. All of the reliability data being produced would not be of immediate use. However, over a longer period, this pooled data could provide a base line for future work. They would provide first-hand know-how on similar problems and save valuable time. Also, if such an information center were not strictly a library or cataloguing function, but was operated in conjunction with a technical reliability group, it could prepare state-of-the-art reports or resumes that would be of use in the most needed areas.

(3) To utilize present reliability studies to generate data of over-all usefulness, rather than to get data just for the immediate job. This would be valuable even if a common information center is not available. By extending the thinking and effort on present studies, future time and money could be saved at relatively little added expense now. Examples of the types of data needed are (1) failure rates as a function of various environmental factors, (2) data on effects of combined environments, (3) analysis of causes of failures to improve designs, and (4) nondestructive tests that could act as indicators of future failures and that would serve as screening tests on parts to go into a system. As an example of the last point, noise or voltage coefficient measurements on resistors might be used to predict those subject to early failure if used in a system.

(4) To upgrade all specifications as far as possible. Usually a specification is conceived as a purchase document to control quality. Out of necessity, designers and others have had to use specifications as a part of their design and application data. As soon as enough suitable data are available on any general type of com-

ponent or material, their addition to the specification as application or reliability data is important.

(5) To increase emphasis upon reliability. Reliability is a way of thinking and, as technology advances on all fronts, it will continue to be of importance. Each new environment and each new component or technical development brings about a new set of conditions which must be evaluated. As an example, we are at present on the threshold of widespread use of nuclear power. This development produces another environment to consider, both from its immediate effects on all present equipment and on its interactions and combined effects with other environmental conditions.

There are many indications that the general area of reliability will produce another important segment of the over-all engineering field. It may eventually be known by some other name than application engineering or reliability engineering. However, its prime importance will be in working in much the same way as present reliability groups do to provide liaison between manufacturing, research, and other groups, to consider effects of various environments and, in general, to strive toward engineering the product to withstand the various environments it will encounter.

Although present emphasis is on military items, there are many areas outside the military where reliability techniques could be applied. Some broad areas are public utilities, airlines, railroads, automobiles, and consumer goods, such as television or automatic washers. Reliability engineering might be able to increase safety, provide better service, develop fail-safe features, or reduce maintenance or warranty costs to the manufacturer.

AGE OF DELIBERATE CREATIVENESS

"The historians of the future may well select the development of deliberate creativeness as the most important development of this century. We have passed through the ages of random creativeness and are entering an age of deliberate creativeness. With this technique there is almost certainty that we can fulfill our needs, desires, and whims in the future . . . What we have today is wonderful; but what there will be tomorrow will be much better."

Maurice Nelles
Borg-Warner Central Research Laboratory

NOTES from BATTELLE

* NEW COMPUTER AT BATTELLE

A major increase in the capacity and versatility of Battelle's computing center has been announced by J. J. Stone, Jr., head of the Institute's systems engineering research.

The additional capacity is provided by a "digital" computing machine (IBM Type 650) that performs vast mathematical problems with lightning-like rapidity. Such a computer is capable of handling almost any technical or business problem that can be reduced to numerical form.

The center handles, with the aid of electronic computers, large arithmetic problems such as those involved in payrolls and inventories. It also works out the arithmetical parts of complex or lengthy mathematical problems connected with research.

A key part of the new computer is a magnetic drum for storing the instructions and numbers used in its calculations. This drum, storing 20,000 digits and revolving 12,500 times a minute, accounts in part for the speed with which the computer can process data.

The computing center at Battelle provides industry with services needed for creating computing systems to accomplish office, laboratory, and factory automation and for understanding problems associated with their operation.

Stone points out that certain types of computers can mimic the operation of machines or factories, that is, they simulate the operation of a system. In systems simulation, says Stone, engineers aided by these "digital" and "analog" computers can build the equivalent of an entire oil refinery or chemical plant in their laboratory merely by making sets of electrical connections. Then by running the computer, they can produce mathematical pictures of just how the oil refinery or machine will perform under certain conditions. Such studies, says the Battelle technologist, enable companies to build their plants and machines to operate more efficiently.

* NEW OPAQUE ENAMELS

In exploratory experiments, Battelle ceramists have discovered that the introduction of vanadium pentoxide into lead-borosilicate compositions produced white, opaque glasses. Since such glasses are fusible and mature at temperatures from 1125 to 1200 F, qualities desirable in decorative glasses, it was natural that their use for decorating glass and aluminum should be explored.

A. K. Smalley, B. W. King, and W. H. Duckworth of Battelle carried on the investigation for the Metals Research Laboratories of the Electro Metallurgical Company, a Division of the Union Carbide and Carbon Corporation. They report that white opaque enamels for glasses were developed by using three weight per cent of V_2O_5 in the raw batch. None of the usual opacifying mill additions were needed. The resulting enamels have low-maturing temperatures and pleasing appearance, and they are suitable for general-purpose applications.

Similar enamels were developed for use on aluminum. These contained eight weight per cent of V_2O_5.

Normal methods of preparing, applying, and firing were employed. Some of the experimental glass enamels had marginal resistance to hot alkali solutions while others appeared suitable for general-purpose enamels. The aluminum enamels, for which acid and weather resistance are desirable, were rated as having Class "A" acid resistance according to the Porcelain Enamel Institute's system of classification. Both types of enamel appear ready for pilot-scale trials.

* AREAS FOR DIAPHRAGM STUDIES

Because of the widening areas in which pressure-measuring instruments are being found useful, the need for improving their dependability and accuracy has become a matter of increasing technical concern. Among the groups interested in diaphragm improvement is the Research Committee for Mechanical Pressure Elements of the American Society of Mechanical Engineers. The Committee's Diaphragm Subcommittee is approaching the problem in a number of ways. Their literature survey has yielded numerous suggestions for future research on diaphragms for pressure elements.

An unofficial report based on these suggestions was prepared by Fred H. Lyon and Horace J. Grover of Battelle and presented at the Society's November, 1956

annual meeting. In it, they reviewed a number of areas in which future diaphragm research may be profitable. Their discussion proposed:

More complete development of pressure-deflection-stress relations for various diaphragm configurations. New methods of mathematical analysis are also needed.

Information on frequency response of diaphragms in dynamic loading. A summary of available data is desirable; analytical studies are also needed.

Analytical study of effects of: transient loading, material anisotropy, uniform temperatures and thermal gradients, and thermotransients.

Development of better methods for putting material properties (including anelastic behavior, fatigue behavior, etc.) into diaphragm design.

Summarization of existing information on fatigue of diaphragms showing present state of knowledge and research required.

* NEW DIVISION ESTABLISHED

A reactor physics division has been established at Battelle. One of its primary functions is to coordinate the increased volume of reactor research now under way at the Institute.

Under the direction of Joel W. Chastain, Jr., the reactor physics division will conduct research in four major fields of nuclear technology. These include radiation effects programs and exponential experiments utilizing Battelle's one-megawatt nuclear reactor, reactor design development through critical experiments, theoretical reactor design analysis, and heat-transfer studies.

Chastain points out that Battelle reactor physics research is complemented by Institute research on reactor materials and metallurgy, fuel-element development, and radiochemistry—research with a volume of more than $5 million in 1956.

Battelle's new research reactor serves as a high intensity source of neutrons and gamma rays for evaluating beneficial and detrimental effects of radiation on reactor materials, electrical components, and chemicals and chemical processes. It is also employed in exponential experiments involving fuel-element development. The critical assembly laboratory is specifically designed for execution of experiments at "zero power" on mocked-up reactor cores. Such experiments produce values for reactor design parameters that are needed to complete the core specifications.

Reactor design work is conducted by a group of physicists who evaluate data from critical experiments and analyze existing and proposed reactors for operational feasibility. The division's heat-transfer research involves studies of void formation and variation of density of moderators under boiling heat flux conditions. Other work includes the improvement of the techniques of, and the development of applications for, the cyclic heat method of measuring average heat-transfer coefficients of reactor fuel systems.

* **The National Science Foundation** is undertaking a series of surveys of the total research and development effort in the United States. The most recent study, Research and Development by Nonprofit Research Institutes and Commercial Laboratories, 1953, is now available from the Government Printing Office. It was prepared by the Maxwell Research Center of Syracuse University.

Here are two excerpts from the published report:

"The fields of science explored pose an extremely variegated pattern. Chemistry appears to be the most common field of activity, engineering second, and physics third . . .

"One of the most dramatic changes of the last ten years has been a general expansion into new fields of research such as radioactivity, synthetic materials, propulsion, aerodynamics, electronics, and solid-state physics . . . in both types of research organizations the pressure overwhelmingly has been in favor of immediately applied research. In 1953, nonprofit research institutes reported $3.3 million spent on basic research and commercial laboratories spent an estimated $3.8 million."

* **New printed material** which is available on request from Battelle's Publications Office includes: "Advisory Studies for Management"—folder describing the Institute's services in the areas of industrial economics area development; operations research; product development; and general research, production, marketing and information management. "Battelle Reports Published by the Office of Technical Services"—a listing of those reports of government-sponsored research which have been released for publication. Subject headings include plastics and elastomers, ceramics, electronics, fuels and combustion, metals (aluminum, ferrous, titanium). "Opportunities for Engineers and Scientists"—extensively illustrated brochure outlining career opportunities at Battelle's Columbus, Ohio, laboratories.

Writings by STAFF Members

Journal of Metals, v. 8; *American Institute of Mining, Metallurgical, and Petroleum Engineers, Transactions*, December 1956 contains the following writings by staff members.

Desiliconized Pig Iron for the Electric Furnace a Possibility. S. L. Case, p. 1645.

An analysis of melting variables indicates that desiliconizing of hot metal charge will make an important reduction in costs of electric furnace operations.

Experimental Determination of Oxygen in Cupola-Melted Cast Iron. E. A. Loria, H. W. Lownie, Jr., and M. W. Mallett, pp. 1670-1672.

Analyses were made on metal and slag from melts made under normal and oxidizing conditions. From these data, relations were established between melting variables and composition of the cast iron.

Allowance for Stress Concentration in Design to Prevent Fatigue. Horace J. Grover. Paper from *International Conference on Fatigue of Metals*. v. I. Institution of Mechanical Engineers. London. 9 pp.

Evidence for effective stress-concentration factors was derived from laboratory tests on specimens with simple geometrical discontinuities under various load conditions.

Members of the Battelle staff are authors of the recently published articles and books listed on this page. In most cases, reprints are available from the Battelle Publications Office, 505 King Avenue, Columbus 1, Ohio.

Self-Controlling Etch for Silver. Philip F. Kurz. *Journal of Chemical Education*, v. 33, December 1956, pp. 625-626.

Describes a self-controlling etching process which has been found useful for cleaning and preparing silver surfaces for further chemical treatment. The self-controlling feature of the process is based on the realease of NO_2 by heating solutions containing HNO_3 and $NaNO_2$.

Some Suggestions for Research in Diaphragm Technology. F. H. Lyon and H. J. Grover. 12 pp. 1956. American Society of Mechanical Engineers, New York.

Extension of work on pressure-deflection response, anelastic effects, temperature behavior and fatigue of diaphragms is discussed from the design viewpoint.

An Apparatus for the Determination of Stress-Strain Properties at High Rates of Strain. R. J. MacDonald, R. L. Carlson, and W. T. Lankford. Paper from *Proceedings of the Society for Experimental Stress Analysis*. v. XIV. No. 1. pp. 163-170.

Total strain rates ranging from one-fourth to 190 inches per minute were obtained using a 10-ton Denison hydraulic press in conjunction with a specially designed subpress. Stress-strain curves indicate the effects of a range of strain rates and temperatures on the initial yielding behavior o flow-carbon steel.

Team Research in Fertilizer Economics. Odin Wilhelmy, Jr., Lawrence L. Lortscher, and George F. Sachsel. *Journal of Agricultural and Food Chemistry*, v. 4, November 1956, pp. 920-924.

An analysis of the problems faced by fertilizer manufacturers indicate the need for a group of experts to gather and analyze the data that management needs to make intelligent decisions. Three case histories show the effectiveness of the team approach.

WORLD-WIDE ABSTRACTS

in the FIELDS *of*

83a Aeronautical Engineering
84a Agriculture
85a Biochemistry and Biophysics
86a Ceramics and Concrete
87a Chemical Engineering
89a Chemistry—Analytical
92a Chemistry—Inorganic and General
93a Chemistry—Organic
95a Chemistry—Physical
99a Coatings
101a Control Systems, Computers, and Systems Engineering
103a Electrical Engineering
104a Electrochemistry
105a Electronics
108a Engineering Economics
109a Fluid Mechanics
110a Food Technology
110a Fuels and Combustion
111a Geology, Geophysics, Mineralogy, and Mining Engineering
112a Graphic Arts
112a Heat Power
113a Information—Preparation and Dissemination
114a Instrumentation
115a Lubrication and Friction
115a Mechanical Engineering
117a Metallurgy
119a Metals—Corrosion
122a Metals—Extraction and Refining
124a Metals—Finishing, Polishing, and Cleaning
124a Metals—Foundry Practice
125a Metals—Heat Treatment
126a Metals—Mechanical and Physical Properties
133a Metals—Mechanical Working
135a Metals—Metallography, Transformations, and Structures
139a Metals—Powder
139a Nondestructive Testing and Quality Control
140a Nuclear Physics, Nucleonics, and Radiation
143a Operations Research and Management Engineering
144a Ore and Materials Beneficiation
144a Physics
146a Plastics
148a Pollution and Wastes
149a Rubber and Elastomers
149a Space Heating and Conditioning
150a Textiles, Fibers, Leather, and Paper
151a Welding and Joining
152a Miscellaneous

BATTELLE Technical Review ABSTRACTS

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***Asterisks mark items that may be used in the Battelle Library only. None of the unbound materials listed below are available for interlibrary loan.**

AERONAUTICAL ENGINEERING

1727 Jet-Induced Circulation Control. II-III. L. Malavard, Ph. Poisson-Quinton, and P. Jousserandot. *Aero Digest*, v. 73, Nov. 1956, p. 34 + 6 pages.

Circulation control is achieved by means of a full-span blowing jet of variable orientation located at or near a wing's trailing edge. Application to aircraft design in terms of experimental data and proposed airplane configurations.

1728 Surface-Protection and Cooling Systems for High-Speed Flight. D. J. Masson and Carl Gazley, Jr. *Aeronautical Engineering Review*, v. 15, Nov. 1956, p. 46-55.

Deals with systems for surface protection against transient and continuous heat inputs, corresponding to typical missile and aircraft flight paths. Comparisons of various systems are made for several typical operating conditions.

1729 Induction System Selection. Harry Drell and Thomas A. Sedgwick. *Aeronautical Engineering Review*, v. 15, Nov. 1956, p. 67-75.

A comparison of internal and external compression supersonic induction systems.

1730 Condensation Effects and Air Drying Systems for Supersonic Wind Tunnels. J. J. Smolderen. *AGARDograph*, no. 17, July 1956, 79 p. (TL565 Ag11g Contin.)

Also includes survey of devices for determining humidity.

1731 Incremental Collapse Due to Thermal Stress. E. W. Parkes. *Aircraft Engineering*, v. 28, Nov. 1956, p. 395-396.

It is shown that although a wing has adequate factors of safety under the flight loads both at normal and elevated temperatures, a tip deflection of 10% of the span will be acquired after five flights.

1732 Investigation of the Temperature Distribution and Thermal Stresses in a Hypersonic Wing Structure. Martin A. Goldberg. *Journal of the Aeronautical Sciences*, v. 23, Nov. 1956, p. 981-990.

The transient temperature distribution and thermal stresses in an idealized stiffened skin stringer panel isolated out of a multicell wing are calculated for a typical hypersonic aircraft.

1733 Some Examples of Laminar Boundary-Layer Flow on Rotating Blades. Nicholas Rott and William E. Smith. *Journal of the Aeronautical Sciences*, v. 23, Nov. 1956, p. 991-996, 1006.

Solutions show effect of rotation on laminar boundary layers for several cases of accelerated and decelerated flow.

1734 Thermal Buckling of Supersonic Wing Panels. N. J. Hoff. *Journal of the Aeronautical Sciences*, v. 23, Nov. 1956, p. 1019-1028.

Temperature and thermal stress distributions are analyzed in multicellular supersonic wing structures. A buckling criterion is established for the panels of cover plates subjected to thermal stresses.

1735 Conical Techniques for Incompressible Nonviscous Flow. Homer J. Stewart and Allen I. Ormsbee. *Journal of the Aeronautical Sciences*, v. 23, Nov. 1956, p. 1029-1036.

Analytical investigation of incompressible potential fields which are homogeneous of order zero.

1736 Reduction of Drag Due to Lift in Supersonic Flight by Distributing Lift Along a Fuselage. R. M. Licher. *Journal of the Aeronautical Sciences*, v. 23, Nov. 1956, p. 1037-1043.

An elliptic wing carrying the optimum lift distribution for that plan form is used to demonstrate the possible drag reduction.

1737 Jet-Engine Noise Reduction Research at NACA. Newell D. Sanders and Edmund E. Callaghan. *Noise Control*, v. 2, Nov. 1956, p. 43-48.

Research on several jet engine mufflers. Thrust is sacrificed for muffling effect. Considers retractable mufflers for cruising altitudes.

1738 Thermal Problems in Aircraft Structures. N. J. Hoff. *North Atlantic Treaty Organization, Advisory Group for Aeronautical Research and Development Report* 2, June 1956, 25 p. (TL565 Ag11r Contin.)

Study of problems that develop in the structural design of aircraft when high supersonic speeds cause elevated temperatures.

1739 Wind Tunnel Models. R. P. Davis. *North Atlantic Treaty Organization, Advisory Group for Aeronautical Research and Development Report* 19, Aug. 1956, 56 p. (TL565 Ag11r Contin.)

Design and construction.

1740* (French.) Approximate Calculation of a Transonic Fan Grill. **Calcul approximatif d'une grille d'aubes transsonique.** Robert Legendre. *Recherche Aéronautique*, 1956, no. 53, Sept.-Oct. 1956, p. 3-12.

Determination of the efficiency of fan grills with high speeds. The mathematical problem arising was solved in definite cases by series development. Convergence of the series was proved by low speed flows.

1741* (French.) A Method of Visualizing Supersonic Flows. **Sur une méthode de visualisation des écoulements supersoniques.** G. Dubois. *Recherche Aéronautique*, 1956, no. 53, Sept.-Oct. 1956, p. 33-42.

Determining the local Mach number and visualizing the streamlines of any supersonic flow.

1742 Supersonic Flight. *Royal Aeronautical Society, Journal*, v. 60, Nov. 1956, p. 697-735.

Papers concerning the aerodynamics, propulsion, structure, and control of supersonic airplanes and missiles.

1743 Crack Detection in Aircraft Structures. W. Deck. *Royal Aeronautical Society, Journal*, v. 60, Nov. 1956, p. 739-748.

Penetrant, magnetic, electrical, and X-ray methods of detecting surface and internal cracks.

1744 An Exact Theory of a Thin Aerofoil With Large Flap Deflection. J. A. Hay and W. J. Eggington. *Royal Aeronautical Society, Journal*, v. 60, Nov. 1956, p. 753-757.

1745* (French.) Some Physical Aspects of the Air-Flow on Airplane Wings. **Quelques aspects physiques du soufflage sur les ailes d'avion.** Ph. Poisson-Quinton. *Technique et Science Aéronautiques*, 1956, no. 4, p. 163-195.

A study of the incompressible aspect of air-flow including mechanism, fundamental parameters, use of aspiration to control the boundary layer, the "jet flap" problem, lateral control and roll damping, and reducing the minimum resistance of a profile.

1746 Transonic Flow Past Cone Cylinders. George E. Solomon. *U. S. National Advisory Committee for Aeronautics, Report* 1242, 16 p. (TL521 Un3r Vis.)

Interferometric results for several typical flow configurations. An example of shock-free supersonic to subsonic compression is demonstrated.

1747 A Theory for Stability and Buzz Pulsation Amplitude in Ram Jets and an Experimental Investigation Including Scale Effects. Robert L. Trimpi. *U. S. National Advisory Committee for Aeronautics, Report* 1265, 1956, 24 p. (TL521 Un3r Vis.)

Stable flow for such ram jets depends upon the instantaneous values of mass flow and total pressure recovery of the supersonic diffuser and immediate neighboring subsonic diffuser.

1748 Charts for Estimating Performance of High-Performance Helicopters. Alfred Gessow and Robert J. Tapscott. *U. S. National Advisory Committee for Aeronautics, Report* 1266, 1956, 33 p. (TL521 Un3r Vis.)

Theoretically-derived charts showing the profile drag/thrust ratio are presented for helicopter rotors operating in forward flight and having hinged rectangular blades with a linear twist of 0,-8 and-16°.

1749 Aeroelastic Problem of Airplane Design. H. G. Küssner. *U. S. National Advisory Committee for Aeronautics, Technical Memorandum* 1402, Nov. 1956, 51 p. (Translated from *Zeitschrift für Flugwissenschaften*, v. 3, no. 1, Jan. 1955, p. 1-8.) (TL570 Un3tm)

Review of recent progress in the field of wing flutter and related matters.

1750 Some Observations on Maximum Pressure Rise Across Shocks Without Boundary-Layer Separation on Airfoils at Transonic Speeds. Walter F. Lindsey and Patrick J. Johnston. *U. S. National Advisory Committee for Aeronautics, Technical Note* 3820, Nov. 1956, 27 p. (TL570 Un3t)

See also: **2239** (semiconductor devices in aircraft); **2402** (rocket power plants); **2408** (turbojet design); **2418** (solar power for spacecraft); **2422** (performance of thrust-reversing equipment); **2484** (fatigue of aircraft components); **3268** (air space regulations).

AGRICULTURE

1751 Low-Pressure Insecticidal Space Sprays. J. H. Fales, R. A. Fulton, and O. F. Bodenstein. *Aerosol Age*, v. 1, Dec. 1956, p. 35-38.

Formulation in which propellant 11 has been replaced with an equal amount of deodorized kerosene. Effectiveness against insects is compared with aerosols and ordinary sprays.

1752 Agronomy. v. V. Corn and Corn Improvement. George F. Sprague, editor. 699 p. 1955. Academic Press, New York. (SB191.M2 Sp72c)

A comprehensive account of the present status of our knowledge concerning breeding, production, and utilization.

1753 Agronomy. v. VI. The Hardiness of Plants. J. Levitt. 278 p. 1956. Academic Press, New York. (QK754 L57h)

A comprehensive collection of known facts pertaining to resistance of plants to extremes of moisture and temperature.

1754 The Inhibitory Activity of Extract of Capsicum Frutescens on Plant Virus Infections. Colin D. McKeen. *Canadian Journal of Botany*, v. 34, Nov. 1956, p. 891-903.

1755 The Enzymically Catalyzed Oxidation of Indoleacetic Acid. E. R. Waygood, Ann Oaks, and G. A. Maclachlan. *Canadian Journal of Botany*, v. 34, Nov. 1956, p. 905-925.

Dialyzed wheat leaf extracts, catalase, and horse-radish peroxidase catalyze the decarboxylation and oxidation of indoleacetic acid at pH 5.0 to 6.0 in the presence of critical concentrations of Mn, monohydric phenols, or resorcinol.

1756 Pesticides Past, Present and Prospects. III. Fungicides, Herbicides. Carl D. Fischer. *Chemical Week*, v. 79, Nov. 17, 1956, p. 69-99.

Market statistics; leading producers; manufacturing processes; acute oral toxicity; principal formulations; major end-uses.

1757 Growing Plants in an Indoor Greenhouse—A Guide. Edmund C. Berkeley. 24 p. 1956. Berkeley Enterprises, Inc., Boston. (SB415 B45g)

Manual on the starting and maintenance of a "Greenarium", a small, plastic enclosed indoor greenhouse.

1758 Handbook on Control of Plant Growth. George S. Avery, Jr., editor. 112 p. 1952. Brooklyn Botanic Garden, Brooklyn. (QK745 P69h)

A guide to uses of hormones in ornamental horticulture, prevention of sprouting, fruit growing, induction of flowering, plant breeding, and weed control. Includes list of 454 weeds and how to control them.

1759 Formulation by Electronic Computer. John H. Payne, Jr. and Stewart D. Daniels. *Journal of Agricultural and Food Chemistry*, v. 4, Nov. 1956, p. 925-928.

A systematic appraisal of the variables involved in formulating a granular fertilizer.

1760 Structure and Insecticidal Activity of Some Diethyl Substituted Phenyl Phosphates. T. R. Fukuto and R. L. Metcalf. *Journal of Agricultural and Food Chemistry*, v. 4, Nov. 1956, p. 930-935.

Twenty-four types were quantitatively examined and their properties compared with the lability of the phosphorus-oxygen-aromatic bond as measured by hydrolytic stability, infra-red stretching frequencies, and Hammett's sigma values.

1761* The Effects of 2:4-Dichlorophenoxyacetic Acid, 2:3:5-Tri-Iodobenzoic Acid, and Thiourea on the Vegetative and Reproductive Growth of *Avena Sativa*. D. Wynn Parry. *Journal of Experimental Botany*, v. 7, Sept. 1956, p. 381-386.

1762* Reversal of the Light Inhibition of Pea Stem Growth by the Gibberellins. James A. Lockhart. *National Academy of Sciences of the United States of America, Proceedings*, v. 42, Nov. 1956, p. 841-848.

Observations on dwarf and normal peas.

1763* Atmospheric Fluoride: Its Uptake and Distribution in Tomato and Corn Plants. Ida A. Leone, E. Brennan, and R. H. Daines. *Plant Physiology*, v. 31, no. 5, Sept. 1956, p. 329-333.

Deals with experiments designed to trace the fate of fluoride in growing plants as a result of exposure to a constant total amount of HF gas administered at various time-concentration levels.

1764* Overwintering Trends of Cold Resistance and Carbohydrates in Medium Red, Ladino, and Common White Clover. O. Charles Ruelke and Dale Smith. *Plant Physiology*, v. 31, no. 5, Sept. 1956, p. 364-368.

Most of the cold resistance was developed in each clover soon after permanent soil freezing and after the average weekly air temperatures began to remain below freezing. Marked decrease did not occur until late Apr.

1765 Isotopes in Soil and Fertilizer Research. O. Talibudeen. *Research*, v. 9, Nov. 1956, p. 426-435.

Application of tracer techniques to physical and chemical investigation of soil. Methods used in analysis of soil constituents; preparation of labeled compounds.

See also: **1777** (tobacco mosaic virus); **1866** (production of maleic acid hydride); **1871** (analysis of soils); **2009** (organphosphorus growth regulators); **2160** (proportioning grain and feed formulas); **2320** (electricity in farming); **2321** (fertilizer manufacturing).

BIOCHEMISTRY AND BIOPHYSICS

1766* (English.) **New Spectrophotometric Methods for Investigation of the Respiratorical Enzymes of Yeast.** H. Lundegårdh. *Acta Chemica Scandinavica*, v. 10, no. 7, 1956, p. 1083-1096.

1767* (English.) **Fungus Pigments. IV. Aurantiacin, the Pigment of *Hydnum Aurantiacum* Batsch.** Jarl Gripenberg. *Acta Chemica Scandinavica*, v. 10, no. 7, 1956, p. 1111-1115.

Aurantiacin is 2,5-bis(benzoyloxy)-3,6-bis(*p*-phdroxyphenyl)-1, 4-benzoquinone, a dibenzoate of the previously known fungus pigment atromentin.

1768 The Interaction of Purified Antibody With Optically Isomeric Haptens. Fred Karush. *American Chemical Society, Journal*, v. 78, Nov. 5, 1956, p. 5519-5526.

The azohapten-antibody combination was studied by the method of equilibrium dialysis at two temperatures. The inhibitory effect of several structurally related haptens was evaluated.

1769* Destruction of Microorganisms in Water, Sewage, and Sewage Sludge by Ionizing Radiations. Harry N. Lowe, Jr., William J. Lacy, Bernard F. Surkiewicz, and Robert F. Jaeger. *American Water Works Association, Journal*, v. 48, Nov. 1956, p. 1363-1372.

1770 Analytical Problems in Biological Systems. *Analytical Chemistry*, v. 28, Dec. 1956, p. 1853-1866.

Two papers discussing paper chromatography in steroid determination, and use and abuse of *p*H measurements.

1771* Chromatographic Purification of Southern Bean Mosaic Virus. John R. Shainoff and Max A. Lauffer. *Archives of Biochemistry and Biophysics*, v. 64, Oct. 1956, p. 315-318.

Chromatographic procedure which has several advantages over electrophoresis for the separation of pigment from the infectious nucleoprotein of this virus.

1772* Some Properties of Uridine Diphosphoglucose Dehydrogenase. Elizabeth S. Maxwell, Herman M. Kalckar, and Jack L. Strominger. *Archives of Biochemistry and Biophysics*, v. 65, Nov. 1956, p. 2-10.

Kinetics of the enzyme were studied. Thiosemicarbazide exerts an indicative type of inhibition.

1773* The Effect of Ionization on the Light Scattering of Isoionic Proteins. John G. Kirkwood and Serge N. Timasheff. *Archives of Biochemistry and Biophysics*, v. 65, Nov. 1956, p. 50-57.

An equation is developed for the effect of progressive ionization on light scattering.

1774* The Rotatory Dispersion of Amino Acids and Proteins. John A. Schellman and Charlotte Green Schellman. *Archives of Biochemistry and Biophysics*, v. 65, Nov. 1956, p. 58-69.

Suggests that optical rotation of many proteins and polypeptides is primarily a function of the configuration rather than of amino acid content.

1775* Reaction of Aldoses With Amino Compounds. G. Haugaard and L. Tumerman. *Archives of Biochemistry and Biophysics*, v. 65, Nov. 1956, p. 86-92.

Presents the kinetics of glucose condensation with leucylglycine, β-lactoglobulin, and *p*-aminobenzoic acid.

1776* Protein Chromatography on Calcium Phosphate Columns. A. Tiselius, S. Hjertén, and Ö. Levin. *Archives of Biochemistry and Biophysics*, v. 65, Nov. 1956, p. 132-155.

Chromatography of a number of proteins of mol. wt. from about 10,000 to several million. A means of "seeing" in the ultraviolet by television is described.

1777* Studies on the Alkaline Degradation of Tobacco Mosaic Virus. I. Ultracentrifugal Analysis. W. F. Harrington and H. K. Schachman. *Archives of Biochemistry and Biophysics*, v. 65, Nov. 1956, p. 278-295.

Shows that some of the intermediates and even some of the final products are the result, not of degradation of larger components, but rather of aggregation of smaller degradation products.

1778* The Antibacterial Action of Some Basic Amino Acid Copolymers. Leah Bichowsky-Slomnicki, Arieh Berger, Joseph Kurtz, and Ephraim Katchalski. *Archives of Biochemistry and Biophysics*, v. 65, Nov. 1956, p. 400-413.

Preparation and properties of 22 poly-α-amino acids are presented.

1779* Metabolic Changes in Nucleic Acids During the Induction of Enzymes by Oxygen in Resting Yeast. H. Chantrenne. *Archives of Biochemistry and Biophysics*, v. 65, Nov. 1956, p. 414-426.

1780* Effects of Radiation of Catalase Solutions. I. Kinetic Studies of Inactivation. II. The Protecting Action of Complexing Agents. H. C. Sutton. *Biochemical Journal*, v. 64, Nov. 1956, p. 447-460.

Solutions are protected against X-ray inactivation when the iron centers in catalase are complexed with HCN.

1781 The Non-Enzymic Reduction of Trimethylamine Oxide to Trimethylamine, Dimethylamine, and Formaldehyde. E. B. Vaisey. *Canadian Journal of Biochemistry and Physiology*, v. 34, Nov. 1956, p. 1086-1090.

Trimethylamine oxide at temperatures between 22 and 24 C is readily reduced by cysteine in the presence of iron or hemoglobin as a catalyst. Glutathione could not replace cysteine as a reducing agent, neither could Cu or Mn replace Fe compounds as catalysts.

1782 The Enzymatic Reduction of Tetrazolium Salts by Amines. J. R. Lagnado and T. L. Sourkes. *Canadian Journal of Biochemistry and Physiology*, v. 34, Nov. 1956, p. 1095-1106.

Some properties of the amine dehydrogenating system in rat liver and brain. Evidence for requirement of a heat-stable factor in the anaerobic reaction.

1783 Size, Stability, and Heterogeneity of Apurinic Acid. G. C. Wood and David B. Smith. *Canadian Journal of Biochemistry and Physiology*, v. 34, Nov. 1956, p. 1107-1117.

1784 Inhibition of Amine Oxidase by Metal Ions and by Sulphydryl Compounds. J. R. Lagnado and T. L. Sourkes. *Canadian Journal of Biochemistry and Physiology*, v. 34, Nov. 1956, p. 1185-1194.

1785* Utilization of Added Substrates by Uredospores of Wheat Steam Rust. P. Shu, A. C. Neish, and G. A. Ledingham. *Canadian Journal of Microbiology*, v. 2, Oct. 1956, p. 559-563.

Uredospores have complete enzyme systems for utilization of carbohydrates, lipids, and amino acids.

1786* Studies of Mississippian Algae. J. Harlan Johnson and Kenji Konishi. *Colorado School of Mines, Quarterly*, v. 51, Oct. 1956, 131 p.

Description of native algae from Western Canada and *Anatolipora*, a new dasycladacean genus and its algal associates from the lower Carboniferous of Japan.

1787* (German.) Bacteriological Investigation of Surface Active Washing Substances. **Bakteriologische Untersuchungen mit oberflächenaktiven Waschmitteln.** W. Döll. *Fette, Seifen, Anstrichmittel*, v. 58, no. 9, Sept. 1956, p. 778-779.

Behavior of gram positive and negative bacteria in a detergent medium.

1788 The Stripping-Film Technique of Autoradiography. S. R. Pelc. *International Journal of Applied Radiation and Isotopes*, v. 1, no. 3, Nov. 1956, p. 172-177 + 2 plates.

Factors to be considered in design of stripping film are speed, resolving power, freedom from artifacts, and ease of handling. Preparation of specimen and staining techniques are given .

1789 Quantitative Autoradiography Using a Radioactive Wedge. Ya. V. Mamul. *International Journal of Applied Radiation and Isotopes*, v. 1, no. 3, Nov. 1956, p. 178-183 + 1 plate.

Absolute quantitative measurements of the radioactivity distribution in approximately 8μ thick gelatin layers containing C^{14}, S^{35}, or other emitters can be made on the basis of photoemulsion blackening by using a gelatin wedge containing the same isotope.

1790* Characteristics of the New Respiratory Viruses (Adenoviruses). I. Qualitative and Quantitative Aspects of the Neutralization Reaction. Harold S. Ginsberg. *Journal of Immunology*, v. 77, Oct. 1956, p. 271-278.

Titration carried out with types 1-4 APC-RI viruses, type-specific rabbit sera, and human convalescent sera, indicated incubation of virus-serum mixtures at 22 or 37 C was necessary to obtain maximum titers.

1791* Pectic Substances—Water. I. Structural Changes in the Polygalacturonide Chains During Water Adsorption. Frederick A. Bettelheim, Clarence Sterling, and David H. Volman. *Journal of Polymer Science*, v. 22, Nov. 1956, p. 303-314.

An apparatus suitable for studying adsorption of water vapor both volumetrically and gravimetrically. Water vapor isotherms of highly esterified pectin, sodium pectate, and pectic acid.

1792* (Russian.) The Protective Action of Some Substances in the Irradiation of Protein Solutions. **O zashchitnom deistvii nekotorykh veshchestv pri obluchenii belkovykh rastvorov.** T. E. Pavlovskaia and A. G. Pasynskii. *Kolloidnyi Zhurnal*, v. 18, no. 5, Sept.-Oct. 1956, p. 583-588.

The presence of cysteine or ascorbic acid controls degradation as shown by measurements of the sulfhydryl group.

1793* (English.) **On the Antibacterial Action and Mechanism of Nitrofuran Derivatives.** Akio Ohyama. *Kyoto University, Institute for Chemical Research, Bulletin*, v. 34, Mar. 1956, p. 25-55.

The antibacterial activity of 68 nitrofuran derivatives and 18 thiophene derivatives was investigated *in vitro*.

1794* The Properties of Biological Macromolecules in Solution. Paul Doty. *National Academy of Sciences of the United States of America, Proceedings*, v. 42, Nov. 1956, p. 791-800.

1795* Visualization of Individual Macromolecules With the Electron Microscope. Cecil E. Hall. *National Academy of Sciences of the United States of America, Proceedings*, v. 42, Nov. 1956, p. 801-806.

Several examples illustrate advantages of method.

1796* Relations Between Structure and Biological Activity of Certain Viruses. Robley C. Williams. *National Academy of Sciences of the United States of America, Proceedings*, v. 42, Nov. 1956, p. 811-819.

Some observations on a bacterial, a large animal, and a rod-shaped plant virus.

1797 Pharmacognosy. The Study of Natural Drug Substances and Certain Allied Products. Robertson Pratt and Heber W. Youngken, Jr. 2nd Ed. 694 p. 1956. J. B. Lippincott, Philadelphia. (RS160 P88p2)

A textbook concerned primarily with principles and their application in phases of pharmacognosy that are important for the practicing pharmacist. Fundamentals; biosynthetic drugs; practices and procedures; public health problems pertaining to pest and weed control.

1798* The Statistics of Colony Development by *Bact. Coli-Mutabile* on Lactose Agar. A. C. R. Dean and Cyril Hinshelwood. *Royal Society, Proceedings*, v. 146, ser. B, Nov. 13, 1956, p. 109-128.

1799* Observations on Abortive Infection of *Micrococcus Lysodeikticus* With Bacteriophage. H. B. Naylor and Elizabeth Burgi. *Virology*, v. 2, Oct. 1956, p. 577-593.

The observed abortive infection appeared governed by factors inherent in the cells of the mutant culture rather than by the environment.

1800 Vitamins and Hormones. Advances in Research and Applications. Robert S. Harris, G. F. Marrian, and Kenneth V. Thimann, editors. v. XIV. 486 p. 1956. Academic Press, New York. (QP801.V5 V83 Vis.)

Includes chapters on intestinal synthesis of vitamins in non-ruminants, vitamin A and carbohydrate metabolism, insect hormones, bioassay of gonadotropins, and microbiological transformations of steroids.

1801* Toxicity of Six Chemical Compounds to Thirty Cultures of Algae. Thomas E. Maloney and C. Mervin Palmer. *Water & Sewage Works*, v. 103, Nov. 1956, p. 509-513.

All six compounds exhibited some degree of selectivity to the various species of algae tested. Both algal and fish toxicity were considered.

See also: **2015** (bacterial inhibitors); **2285** (betatron for X-ray therapy); **2353** (use of antibiotics in storing meat); **2428** (refractometry of tissue sections); **2994** (radiation effects on living organisms); **2999** (radiation effects on proteins and amino acids); **3059** (physics of radiology).

CERAMICS AND CONCRETE

1802* (German.) Determination of the Distribution of Pore Size in Refractory Materials of Construction and in Porcelain Suction Funnels. **Ermittlung der Grössenverteilung von Poren in feuerfesten Baustoffen und Glasnutschen. II.** Ludwig Žagar. *Archiv für das Eisenhüttenwesen*, v. 27, no. 10, Oct. 1956, p. 657-663.

Determination of pore size. Theoretical and experimental studies of water and air displacement. Classifications of porosity.

1803* (German.) The Melting Phase in Firebricks. **Die Schmelzphase in Schamottesteinen. I.** Arun Kumar Bose, Hermann Müller-Hesse, and Hans-Ernst Schwiete. *Archiv für das Eisenhüttenwesen*, v. 27, no. 10, Oct. 1956, p. 665-671.

Properties of the liquid phase in fire bricks. The best conditions for its solution is hydrofluoric acid; chemical analysis. Influence of temperature.

1804* (Dutch.) "Ocratering". A Dutch Process for the Production of Concrete With Wide Response Abroad. **"Ocrateren". Een Nederlandse vinding vond in het buitenland weerklank.** E. C. Smits. *Bedrijf en Techniek*, v. 11, no. 266, Nov. 17, 1956, p. 725, 727.

A chemical enriching method which alters the composition of concrete at a certain depth, improving its chemical resistance and, indirectly, its mechanical properties.

1805 The Structure of Glazes. H. Moore. *British Ceramic Society, Transactions*, v. 55, Oct. 1956, p. 589-600.

Effects of alkalies and alkaline earths on structure of borate and boro-silicate glasses; structural features and resistance to attack by water; durability of glazes.

1806 Some Physical Properties of Glazes. W. James and A. W. Norris. *British Ceramic Society, Transactions*, v. 55, Oct. 1956, p. 601-630.

Attention is directed to the viscosity of glazes over the temperature range 600 to 1350 C. New methods of measurement are described and results are given for 30 glazes of many types.

1807 New Data on the Alumina-Silica System. N. A. Toropov and F. Ya. Galakhov. *Henry Brutcher Translation No.* 3143, 8 p. (From *Doklady Akademii Nauk SSSR*, v. 78, no. 2, 1951, p. 299-302.) Henry Brutcher, Altadena, Calif.

Presents a new phase diagram of the alumina-silica system, constructed on the basis of experimental results.

1808 Tunnel Kiln Production of Drain Tile. *Ceramic Age*, v. 68, Nov. 1956, p. 18-21.

Highlights of recently modernized plant in which an extremely fine-grained clay is fired successfully on a relatively short schedule.

1809 Lapping for Precision Ceramics. Steve Boetcher. *Ceramic Age*, v. 68, Nov. 1956, p. 26-29.

Lapping is an economical method of removing substantial amounts of material with tolerances as low as ± 0.0001.

1810 (German.) Ceramic Technology. **Technologie der Keramik.** Imfried Liebscher and Franz Willert. 410 p. 1955. VEB Verlag der Kunst, Dresden, Germany. (TP807 L62t)

Covers ceramic raw materials, analysis, preparation of raw material, and ceramic masses. Shaping, drying, firing, glazing, and decorating operations.

1811* (German.) Reaction Patterns in Preparation of Lead Titanate. **Verlauf einiger Pulverreaktionen bei der Bereitung von Bleititanat.** A. Bergstein. *Collection of Czechoslovak Chemical Communications*, v. 21, no. 3, Mar. 1956, p. 542-550.

Preparation from lead oxide and two modifications of TiO_2, and from TiO_2 and $PbCO_3$.

1812* (Russian.) Reflection and Transmission Spectra of Various Silica Modifications, Within 7-24μ Wave Length Range. **Spektry otrazheniia i propuskaniia razlichnykh modifikatsii kremnezema v oblasti dlin voln 7-24 μ.** N. A. Sevchenko and V. A. Florinskaia. *Doklady Akademii Nauk SSSR*, v. 109, no. 6, Aug. 21, 1956, p. 1115-1118.

Experimental method. Results of refraction and transmission measurements.

1813* (French.) Single Baking Applied to Ceramic Industry. **Contribution à l'application industrielle de la monocuisson.** *Industrie Ceramique*, 1956, no. 479, Oct. 1956, p. 223-229.

Various products which improve or permit enamelling of crude specimens. The problem of body consistency.

1814 Study of the Wurtzite-Type Binary Compounds. I. Structures of Aluminum Nitride and Beryllium Oxide. G. A. Jeffrey, G. S. Parry, and R. L. Mozzi. *Journal of Chemical Physics*, v. 25, Nov. 1956, p. 1024-1031.

1815 High Alumina Ladle Linings. V. J. Howard. *Journal of Metals*, v. 8, Dec. 1956, p. 1646-1647.

When handling high temperature metals, the advantages of high alumina are: low shrinkage, high strength, high density, and high temperature resistance. Proper ramming technique and fixing at high temperature before using the ladle are essential.

1816 Zircon Ladle Linings for Cleaner, Low Cost Metal. W. D. Emmett and V. E. Zang. *Journal of Metals*, v. 8, Dec. 1956, p. 1648-1649.

Zircon lining means longer ladle life; considerable savings in cost of lining per ton of metal poured and cleaner metal, but ladles are not easily kept clean of adhering slag and the mix sets up very hard, causing a greater length of time to knock out.

1817 How to Select and Specify Glass. M. W. Riley. *Materials & Methods*, v. 44, Nov. 1956, p. 139-154.

Physical and mechanical properties, commercially available forms, general design recommendations, and characteristics of specialty glasses are presented in manual form for the designer and engineer.

1818* (Russian.) Non-Fired Magnesite Chrome Brick. **Bezobzhigovyi Magnezitokhromitovyi Kirpich.** G. G. Aristov and M. I. Panfilov. *Metallurg*, 1956, no. 10, Oct. 1956, p. 22-23.

The thermal dilatation of burnt magnesite chrome brick in open-hearth furnaces, was compensated by the shrinkage of the non-fired bricks, and stress in the crown was relieved.

1819* (Czech.) New Asbestos-Cement Pipes for Gas Distribution. **Nové asbestocementové trouby pro rozvod plynu.** A. Payer and V. Payerová. *Paliva*, v. 36, no. 4, Apr. 1956, p. 118-124.

Saving steel and iron by using asbestos cement pipes. Tests indicate that they are satisfactory.

1820* (German.) Surface Improvement of Ceramics With Evaporated Aluminum. **Oberflächenveredelung keramischer Massen mit dampfförmigem Aluminium.** E. Eipeltauer and G. Bayer. *Radex Rundschau*, 1956, no. 7, Oct. 1956, p. 354-362.

Surface-finishing operations. The influence of molten Al on silicates.

1821* The Mechanical Strength of Silica and Basic Bricks. G. R. Rigby and W. R. Davis. *Refractories Journal*, v. 32, Oct. 1956, p. 482-492.

High refractoriness value; surface fluxing; methods of measuring strength.

1822* (French.) A Contribution to the Study of Standardized Mortar. Suggestions for Future Standardization. **Contribution à l'étude du mortier normal. Suggestions pour de futures normes.** Michel Venuat. *Revue des Matériaux de Construction*, C, 1956, no. 493, Oct. 1956, p. 221-233.

A systematic study of the qualities that should exist in an internationally standardized mortar. Production method; compressive and tensile strength tests. (To be continued.)

1823* (French.) High Strength Metallurgical Cements. **Ciments sidérurgiques de haute valeur.** F. Ferrari. *Revue des Matériaux de Construction, C*, 1956, no. 493, Oct. 1956, p. 251-253.

A new type rapid hardening pozzolana with standard mixes formed essentially of silica-base or lime cement, and basic slag.

1824* (French.) Creepage in Concrete. **Le fluage des bétons.** R. Dutron. *Silicates Industriels*, v. 21, no. 10, Oct. 1956, p. 379-390.

Observations of the factors influencing shrinkage and creep. Only examination of the structure and properties of the cement used could offer the basis for a creepage theory.

1825* (French.) The Structure of Glass. Thermal Treatment and Viscosity. **Structure du verre, traitement thermique et viscosité.** E. Plumat. *Silicates Industriels*, v. 21, no. 10, Oct. 1956, p. 391-396.

A study of the sudden variations of the activating energy of viscous flow, and of the lattice constant. Deformation theories concerning liquid and semi-solid glass.

1826 Sintering Characteristics of Rare Earth Oxides. G. L. Ploetz and C. W. Krystyniak. *U. S. Atomic Energy Commission, Research and Development Report*, KAPL-1607, Oct. 1956, 20 p. (UF767 Un3.1ka Contin.)

Data on density, grain size, and microhardness for oxides of Eu, Sn, Gd, and Dy.

1827* (German.) The Problem of the Rayleigh-Beilby Layer With Glass. **Zur frage der Rayleigh-Beilby-Schicht bei Glas.** E. Brüche and H. Poppa. *Zeitschrift für Angewandte Physik*, v. 8, no. 10, Oct. 1956, p. 486-491.

Studies of the polishing process using the electron microscope. Consideration of the plastic glass layer as a function of its solidification time. Beilby layer theory.

1828* (Russian.) Strontium Titanate Single Crystals. **Monokristally titanata strontsiia.** A. L. Khodakov, M. L. Sholokhovich, E. G. Fesenko, and O. P. Kramarov. *Zhurnal Tekhnicheskoi Fiziki*, v. 26, no. 11, Nov. 1956, p. 2506-2507.

Two methods of growing single crystals; X-ray data; chemical analysis; dielectric, physical, and mechanical properties.

See also: **2611** (carbon lining for blast furnace); **2614** (oxygen-converter lining); **2636** (ladle-lining life studies); **2644** (runner brick for open-hearth furnaces); **2653** (blast furnace refractories); **2684** (acid cupola lining); **2853** (ceramic cutting tools).

CHEMICAL ENGINEERING

1829 A Possible Method for Packaging Gassified Products. Edward W. Smith. *Aerosol Age*, v. 1, Dec. 1956, p. 56-57, 59.

Method involves the principle of forcing a liquid in the form of a spray into a gaseous atmosphere in a container. The perforable membrane necessary readily lends itself to mass production and installation on the container by automatic means without excessive increase in costs.

1830* Gas Handbook. *American Gas Journal*, v. 183, Nov. 1956, p. 3 + 117 pages.

Weights and measures, conversion tables; horsepower, torque, and electric motor calculations; ASA code for gas distribution and transmission piping; corrosion control methods; proof testing of gas meters for accuracy; odorization of natural gas.

1831 Lectures of the 1956 Short Course on Unit Processes in the Fatty Oil, Soap, and Detergent Industries. II. *American Oil Chemists' Society, Journal*, v. 33, Nov. 1956, p. 545-608.

Includes papers on fatty acids and alcohols, esterification, liquid-liquid extraction, sulfonation, heat transfer, drying of soaps, and principles of mixing.

1832* Use of Molecular Filter Membranes for Water Potability Control. Harold A. Thomas, Jr., Richard L. Woodward, and Paul W. Kabler. *American Water Works Association, Journal*, v. 48, Nov. 1956, p. 1391-1402.

Certain molecular filter techniques may profitably be used in regulatory coliform organism determinations.

1833 Tools for Tomorrow—High Temperatures. N. K. Hiester, A. W. Searcy, and Leo Brewer. *Chemical Engineering*, v. 63, Dec. 1956, p. 173-178.

Three part symposium on producing, containing, and applying high temperatures.

1834 Update Your Reactor Design Method. Ju Chin Chu. *Chemical Engineering*, v. 63, Dec. 1956, p. 183-186.

The kinetic equation is used for the direct approach to develop reactor data as opposed to experimental methods.

1835 How to Clean Equipment Chemically. R. L. Fiske. *Chemical Engineering*, v. 63, Dec. 1956, p. 187-190.

Developments in cleaning procedures for towers, tanks, pumps, compressors, exchangers, condensers, lines, fittings, and valves.

1836 Physical Equilibrium for Equipment Design. II. James O. Osburn. *Chemical Engineering*, v. 63, Dec. 1956, p. 211-216.

1837 Chemical Engineering Practice. v. I. General. v. II. Solid State. Herbert W. Cremer and Trefor Davies, editors. 494 and 632 p. 1956. Academic Press, New York. (TP155 C42e)

Origins and economics of chemical engineering; development of an industrial process; pilot plants and semi-commercial units; flow diagrams; characteristics of metals, alloys, plastics, and glasses; powder metallurgy; porous masses and their uses. Pertinent papers are individually abstracted.

1838* Oils and Fats Processing. M. K. Schwitzer. *Chemical & Process Engineering*, v. 37, Nov. 1956, p. 377-381.

Trends in the extraction, refining and production of food and technical fats.

1839* Heat Transfer Media. P. M. Krishna and D. Venkateswarlu. *Chemical & Process Engineering*, v. 37, Nov. 1956, p. 382-388.

Factors affecting choice of medium; physical and thermodynamic properties; thermal and heat-transfer characteristics; chemical activity and corrosion characteristics; hazards; media for temperatures up to 750 F.

1840* (German.) Design and Construction of Heat Exchanger. **Gestaltung und Berechnung von Wärmeaustauschern. II.** W. Janke. *Chemiker-Zeitung*, v. 80, no. 21, Nov. 5, 1956, p. 750-752.

Forms and thermal properties of some types are explained.

1841 The Manufacture of Phosphorus. F. B. Shepherd. *Chemistry & Industry*, 1956, no. 45, Nov. 17, 1956, p. 1324-1330.

An over-all view of the process.

1842 Size Distribution in Aerosols Determined by Settling of Charged Particles. Vadim G. Drozin and Dante De Deo. *Columbia University (U. S. Atomic Energy Commission)*, NYO-4657, Aug. 1955, 61 p. (UF767 U3ny Contin.)

The method of electrostatic settling is superior in respect to accuracy, time required for determination, and cost of apparatus.

1843* (German.) Flow and Heat Transfer at Falling Liquid Films. **Strömung und Wärmeübergang bei Rieselfilmen.** Heinz Brauer. *Forschung auf dem Gebiete des Ingenieurwesens*, v. 22, Ausgabe B, *VDI-Forschungsheft* 457, 1956, 40 p.

Water and glycol-water mixtures were studied in a vertical tube.

1844* (French.) Delumping, Screening and Filtering by Sound Waves. **Demottage, tamisage et filtration par ondes sonores.** P. Korda. *Génie Chimique (Supplement to Chimie & Industrie)*, v. 76, no. 4, Oct. 1956, p. 109-118.

New devices in which a wire cloth is subjected to vibration.

1845 Commercial Performance of Fluid Cracking Catalysts. A New Technique of Study. W. B. Wilson, G. M. Good, T. J. Deahl, C. P. Brewer, and W. G. Appleby. *Industrial and Engineering Chemistry*, v. 48, Nov. 1956, p. 1982-1989.

Information related to catalyst deactivation can be obtained by measurement of properties on appropriate fractions of the catalyst.

1846 Dielectric Constant Continuous Analyzers in Petroleum. Refining N. F. Chamberlain, B. W. Thomas, J. B. Beaugh, and P. B. Land. *Industrial and Engineering Chemistry*, v. 48, Nov. 1956, p. 1990-1995.

Measuring aromatic content of charge to SO_2 extraction unit; measuring oil content of wax from solvent dewaxing unit; monitoring viscosity index of phenol extracted lubricating oils; instruments and economics of their installation.

1847 Helium-3 and the Liquid Helium Problem. E. F. Hammel. *Industrial and Engineering Chemistry*, v. 48, Nov. 1956, p. 2005-2011.

Properties and theories of liquid He; Landau theory; rare isotope, He-3.

1848 Aqueous Foams. *Industrial and Engineering Chemistry*, v. 48, Nov. 1956, p. 2012-2051.

A symposium of papers on use as a fire extinguishing medium, characterization, foam-generating equipment, bubble size and its determination, mass transfer, and foam drainage.

1849* What Type Dryer for Chemical Processing? R. T. Ellington. *Industrial Gas*, v. 35, Nov. 1956, p. 6-12, 20.

Evaluation of batch-type and continuous gas-fired equipment.

1850 Performance Characteristics of a Centrifugal Gas Absorber. F. Rumford and I. J. Rae. *Institution of Chemical Engineers, Transactions*, v. 34, no. 3, 1956, p. 195-203.

Comparisons are given for the absorption rates of CO_2 in water, ammonia in water, and acetone in water at varying water rates, gas concentrations, rotor speeds, gas rates, and ring perforations.

1851 Efficiency and Wetting Characteristics of Perforated-Plate Columns. F. H. Garner, S. R. M. Ellis, and J. W. Hill. *Institution of Chemical Engineers, Transactions*, v. 34, no. 3, 1956, p. 223-234.

Aqueous phase dispersions are better with P.T.F.E. plates, and correspondingly higher contacting efficiencies are obtained than when metal plates are used.

1852* Water Treatment in the Tropics. E. Field Reid. *Institution of Water Engineers, Journal*, v. 10, Nov. 1956, p. 515-540 + 4 plates.

General nature of tropical waters; methods used for their treatment; measurement of purification rates; portable, mobile, and transportable filters; sterilization, demineralization, and softening.

1853* (Russian.) Catalytic Cracking of Heavy Distilled Fractions of Crude Oils on Alumino-Silica Catalysts. **Kataliticheskii kreking tiazhelykh distilliatnykh fraktsii sernistykh neftei na aliumo-silikatnykh katalizatorakh.** A. V. Agafonov and V. V. Krasivichev. *Khimiia i Tekhnologiia Topliva*, 1956, no. 10, Oct. 1956, p. 1-11.

The transformation of heavy vacuum distillates of oil in the presence of aluminosilicate catalysts of various activations; influence of the process parameters on output and quality of the liquid and gaseous products of cracking.

1854* (Hungarian.) Instrumentation and Automation in the Alumina Plant. **Timföldgyári műszerezés és automatizálás.** Jozsef Fessler. *Kohászati Lapok*, v. 11, no. 8, Aug. 1956, p. 364-367.

Problems of obtaining samples, measuring the quantity of liquid mixtures, continuous control of specific gravity, automatic analysis of mixtures, and automatic control of alumina production.

1855* Mechanical Induced-Draught Cooling Towers. Derek J. Tow. *Nuclear Engineering*, v. 1, Nov. 1956, p. 331-333.

Different water temperatures, made possible by the greater flexibility of the system, necessitate modifications to the power station design conditions.

1856 Application of the Phi Scale to the Description of Industrial Granular Materials. Charles H. Bowern. *Ohio State University, Engineering, Experiment Station, Circular No.* 58, v. 25, no. 4, Sept. 1956, 17 p. (TA21 O3c Vis.)

This system of size analysis expression may be profitably used wherever median grain size, spread of the size distribution, and asymmetry of the distribution may have an important bearing on the product.

1857 Package for Profit. 46 p. 1956. E. I. Du Pont De Nemours & Co., Wilmington. (QD549 D92p Over.)

A comprehensive picture of the aerosol industry, including information on the market and how to enter it, technical data on "Treon" propellents, formulations for aerosol products, and lists of valve and container suppliers and aerosol loaders.

1858 Is Your Distillation Column in Balance? W. D. Harbert. *Petroleum Refiner*, v. 35, Nov. 1956, p. 151-159.

A non-mathematical discussion of column balance and how to achieve it.

1859 Drainage Time of Bubble-Cap Columns. Frank J. Lockhart. *Petroleum Refiner*, v. 35, Nov. 1956, p. 165-168.

Mathematical considerations; physical characteristics of trays; drainage from trays; utilization of idealized relationship.

1860 Here's the Complete Story on This Petrochemical—Pentaerythritol. Peter W. Sherwood. *Petroleum Refiner*, v. 35, Nov. 1956, p. 171-179.

Production, raw materials, reaction conditions, recovery stages, and uses.

1861 Which Steel for High Temperature Piping. E. A. Sticha. *Petroleum Refiner*, v. 35, Nov. 1956, p. 185-189.

Recent developments in connection with ferritic, Cr-Mo, C, and austenitic steels.

1862 Polishes and Cleaning Materials. A. Davidsohn. 3rd Rev. Ed. 298 p. 1956. Leonard Hill, London. (TP940 D28p3)

A guide to compounding and manufacture. Includes the most recent developments, such as silicone polishes and a series of modern synthetic waxes which recently appeared on the market.

1863* (French.) Liquid-Liquid Extraction. **L'extraction liquide-liquide.** Y. I. Gladel and J. Durandet. *Revue de l'Institut Francais du Petrole et Annales des Combustibles Liquides*, v. 11, no. 8, Sept. 1956, p. 1075-1128.

Covers liquid-liquid equilibria, co-current extraction, counter-current extraction, and different types of apparatus.

1864* The Spray Drying of Synthetic Detergents. B. W. Hauschild. *Soap, Perfumery and Cosmetics*, v. 29, Nov. 1956, p. 1235-1240.

Process technology and plant design.

1865* Automation of Boiler Feedwater and Process Water Treatment Plants. Leonard Limon and V. J. Calise. *Tappi*, v. 39, Nov. 1956, p. 68A + 8 pages.

1866 Process Design for Production of Maleic Acid Hydrazide for Weed Control. E. C. Moncrief and W. H. Sawyer. *Virginia Polytechnic Institute, Bulletin, Engineering Experiment Station Series No.* 114, v. 49, no. 12, Oct. 1956, 31 p. (TN21 V81b Vis.)

Selection of an optimum synthesis method, conditions for such method, cost analysis, and actual design of the plant.

See also: **1751** (low pressure aerosol sprays); **2077** (talc catalysts); **2139** (water filtration controls); **2310** (chemical process industries); **2328** (heat transfer in turbulent tube flow); **2329** (heat conduction in forced flow); **2334** (heat transfer between tubes and fluid); **2350** (extraction of carotenes); **2472** (pumping corrosive liquids); **2528** (special metals and equipment for new chemical plant); **2543** (alloys for petroleum refineries); **2602** (metals for use with fluorine); **3067** (fission products in industry); **3174** (aerosol production and size analysis).

CHEMISTRY—ANALYTICAL

1867 Identification of Anionic Synthetic Detergents in Foams and Surface Waters. Aaron A. Rosen, Francis M. Middleton, and Neil W. Taylor. *American Water Works Association, Journal*, v. 48, pt. 1, Oct. 1956, p. 1321-1330.

By carbon adsorption and infra-red spectroscopy, it was possible to prove that some foams encountered at water and sewage treatment plants consisted principally of anionic surfactants of the alkyl benzene sulfonic acid type.

1868 Non-Ferrous Metallurgical Analysis. A Review. G. W. C. Milner. *Analyst*, v. 81, Nov. 1956, p. 619-650.

Critical survey of the chemical and physico-chemical procedures available for the determination of major and minor amounts of many constituents of importance in non-ferrous metallurgy.

1869 Determination of Copper in Steel. L. J. A. Haywood and P. Sutcliffe. *Analyst*, v. 81, Nov. 1956, p. 651-655.

Copper is complexed with bis*cyclo*hexanone oxalyldihydrazone and the resulting blue color is measured by means of the Spekker absorptiometer within the range 570 to 600 mμ.

1870 The Polarographic Determination of Chromium in Molybdenum-Chromium Alloys. D. G. Higgs. *Analyst*, v. 81, Nov. 1956, p. 656-660.

The diffusion-current curves are determined over the range −0.5 to −1.3 volts against a Hg pool and polarograms thus obtained on a damped instrument are well formed and extremely easy to read.

1871 Geochemical Field Methods for the Determination of Tungsten and Molybdenum in Soils. A. A. North. *Analyst*, v. 81, Nov. 1956, p. 660-668.

Toluene-3:4-dithiol is used.

1872 Non-Stationary Platinum Electrodes for the Amperometric Determination of Cysteine and Cystine. B. C. Ray Sarkar and R. Sivaraman. *Analyst*, v. 81, Nov. 1956, p. 668-675.

Rotating and vibrating Pt electrodes are described.

1873* (English.) **Determination of Micro-Amounts of Boron in Uranium Metal and in Uranyl Chloride Solutions.** Louis Silverman and Katherine Trego. *Analytica Chimica Acta*, v. 15, no. 5, Nov. 1956, p. 439-445.

Describes direct colorimetric determination of B (curcumin-oxalic acid method) in uranyl chloride solution.

1874* (English.) **Micro-Heterometric Determination of Traces of Zinc in Solutions and Alloys With Sodium Diethyldithiocarbamate.** Mordechai Bobtelsky and Rafael Rafailoff. *Analytica Chimica Acta*, v. 15, no. 5, Nov. 1956, p. 457-464.

Method tolerates presence of Ca, Sr, Ba, Mg, Al, Cr(III), or Mn(II).

1875* (English.) **The Application of Thiosalts in Analysis. II. Estimations Based on Decomposition of Thiosalts. Pt. D. Estimation of Selenium and Tellurium in Selenates and Tellurates.** G. B. S. Salaria. *Analytica Chimica Acta*, v. 15, no. 6, Dec. 1956, p. 514-517.

1876* (English.) **The Thermal Decomposition of Some Metal Chelates of 5,7-Diiodo-8-Quinolinol (Iodoxine).** Wesley W. Wendlandt. *Analytica Chimica Acta*, v. 15, no. 6, Dec. 1956, p. 533-537.

1877* (English.) **The Determination of Phenols by Chromatography and Spectrophotometry of Their Methyl Ethers. II. The Separation and Quantitative Determination of Methyl Aryl Ethers. III. The Determination of Phenols in Wood Smoke. IV. The Determination of Phenols in Cigarette Smoke.** B. T. Commins and A. J. Lindsey. *Analytica Chimica Acta*, v. 15, no. 6, Dec. 1956, p. 551-558.

1878 Rapid Methods of Analysis. *Analytical Chemistry*, v. 28, Dec. 1956, p. 1838-1853.

Three papers dealing with flame photometry, instrumental methods of γ-ray spectrometry, and instrumentation for rapid spectrochemical analysis.

1879 Determination of Impurities in Silicon by Neutron Activation Analysis. Arthur Kant, J. Paul Cali, and Harriet D. Thompson. *Analytical Chemistry*, v. 28, Dec. 1956, p. 1867-1871.

Involves radiochemical separations, and the characterization and determination of the elements by their induced β activities.

1880 Amperometry With Two Platinum Electrodes With the Cuprous-Cupric Bromine-Bromide System. James J. Lingane and Fred C. Anson. *Analytical Chemistry*, v. 28, Dec. 1956, p. 1871-1875.

1881 Coulometry With Quinquevalent Uranium Determination of Ferric Ion. Kenneth W. Edwards and David M. Kern. *Analytical Chemistry*, v. 28, Dec. 1956, p. 1876-1878.

Quinquevalent U, the primary reduction product of uranyl ion in acid solutions, is a rapid and relatively powerful reducing agent, well suited for use in constant-current coulometry.

1882 Determination of Chloride in Titanium Sponge by the Rapid Potentiometric Method. H. V. Malmstadt, E. R. Fett, and J. D. Winefordner. *Analytical Chemistry*, v. 28, Dec. 1956, p. 1878-1882.

Analysis involves a final measurement of the voltage difference between two Ag-Ag Cl electrodes in a concentration cell, one arm of which contains the unknown Cl solution and the other a standard Cl solution.

1883 Indirect Determination of Free Titanium and of Oxygen in Titanium-Oxygen Alloys by Hydrogen Evolution Method. M. E. Straumanis, C. H. Cheng, and A. W. Schlechten. *Analytical Chemistry*, v. 28, Dec. 1956, p. 1883-1884.

Free Ti is calculated from the volume of H developed by the metal in hydrofluoric acid, if the sample is free from other H developing metals. Oxygen is calculated on the basis of the lower volume of H developed in hydrofluoric acid because of the presence of O in the alloys.

1884 Flame Spectrophotometric Determination of Copper in Ferrous Alloys. John A. Dean and J. Harold Lady. *Analytical Chemistry*, v. 28, Dec. 1956, p. 1887-1889.

Copper, in the form of the salicylaldoxime complex, is selectively extracted from the aqueous solution of the sample with either $CHCl_3$ or *n*-amyl acetate.

1885 Flame Spectrophotometric Determination of Gallium in Copper-Gallium Alloys. Villiers W. Meloche and Benny L. Beck. *Analytical Chemistry*, v. 28, Dec. 1956, p. 1890-1891.

Includes effects of Fe, Al, Tl, In, and Zn upon the emission of Ga solutions.

1886 Photometric Titration of Cerium(III). Thomas L. Marple, E. P. Przybylowicz, and David N. Hume. *Analytical Chemistry*, v. 28, Dec. 1956, p. 1892-1894.

Method is based on oxidation of the Ce to the quadrivalent state with permanganate in a neutral pyrophosphate medium.

1887 Differential Spectrophotometric Determination of Neodymium in Neodymium-Yttrium Mixtures. Charles V. Banks, John L. Spooner, and Jerome W. O'Laughlin. *Analytical Chemistry*, v. 28, Dec. 1956, p. 1894-1897.

1888 Spectrophotometric Method for Simultaneous Determination of Nickel and Cobalt. R. D. Whealy and S. O. Colgate. *Analytical Chemistry*, v. 28, Dec. 1956, p. 1897-1898.

Aqueous solutions of nickelous and cobaltous nitrates react completely with excess diethylenetriamine to form solutions of colored complexes.

1889 Amperometric Titration of the Tetraphenylborate Ion. Method for Potassium. Arthur F. Findeis and Thomas De Vries. *Analytical Chemistry*, v. 28, Dec. 1956, p. 1899-1801.

1890 A Radiological Detector for Gas Chromatography. C. H. Deal, J. W. Otvos, V. N. Smith, and P. S. Zucco. *Analytical Chemistry*, v. 28, Dec. 1956, p. 1958-1964.

Method for sensing changes in the composition of a gas stream exploits differences in β ionization cross sections.

1891 Determination of Oxygen in Titanium, Zirconium, Chromium, Vanadium, and Steels by Bromination-Carbon Reduction Method. Maurice Codell and George Norwitz. *Analytical Chemistry*, v. 28, Dec. 1956, p. 2006-2011.

The factors contributing to the blank were investigated and the blank was reduced considerably by purification of the Br.

1892 Determination of Potassium as the Metaperiodate. Ralph E. Jentoft and Rex J. Robinson. *Analytical Chemistry*, v. 28, Dec. 1956, p. 2011-2015.

1893 Coprecipitation of Rare Earth Iodates With Thorium Iodate Precipitated From Homogeneous Solution. Kenneth J. Shaver. *Analytical Chemistry*, v. 28, Dec. 1956, p. 2015-2019.

Separation efficiency is given in terms of the degree of coprecipitation of a number of rare earths and related elements. Trivalent rare earths coprecipitate with thorium iodate by a type of isomorphous replacement within the thorium iodate lattice.

1894* (German.) Studies of the Emission Spectral Analysis of Steel With the Photoelectrometer. **Untersuchungen zur Emissions-Spektralanalyse des Stahles mit dem Lichtelektrometer.** Heimar Pfundt and Hans Krempl. *Archiv für das Eisenhüttenwesen*, v. 27, no. 10, Oct. 1956, p. 629-635.

Multipliers used in the analysis were compared with photographic plates. A simple photoelectric arrangement is described.

1895* A Simple Apparatus for Rapid Study of Paper Partition Chromatography. Huo-Ping Pan. *Archives of Biochemistry and Biophysics*, v. 64, Oct. 1956, p. 311-314.

Apparatus enables rapid determination of the suitable solvent composition and the conditions for chromatography of a particular sample and is economical in operation.

1896* Analysis of Fresh Meat. Erwin J. Benne, Nancy H. Van Hall, and A. M. Pearson. *Association of Official Agricultural Chemists, Journal*, v. 39, Nov. 1956, p. 937-945.

Procedures employed for determining ash, fat, moisture, and protein contents of meat.

1897* Separation and Identification of Chlorinated Organic Pesticides by Paper Chromatography. VIII. Technical DDT, *P,P'*-DDT, DDA, DDD, DDE, 4,4'-Dichlorobenzophenone and 2,4'-Dichlorobenzophenone. IX. Aldrin, DDE, Dieldrin, DDT, Lindane, Methoxychlor, Perthane, and Rhothane (DDD). Lloyd C. Mitchell. *Association of Official Agricultural Chemists, Journal*, v. 39, Nov. 1956, p. 980-990.

1898* Some Techniques in the Assay of Tritium. T. E. Banks, J. C. Crawhall, and D. G. Smyth. *Biochemical Journal*, v. 64, Nov. 1956, p. 411-416.

A method of estimating tritium in infinitely thick solid samples in a windowless flow-type counter; relative values of gas-counting and solid-counting techniques.

1899 The Use of Complexing Agents for Rare Earth Separation by Ion-Exchange Techniques. N. E. Topp. *Chemistry & Industry*, 1956, no. 45, Nov. 17, 1956, p. 1320-1323.

A historical review including recent developments.

1900* (German.) Complexometric Titration (Chelatometry). **Komplexometrische Titrationen (Chelatometrie). XVII.** Determination of Copper, Iron, Aluminum, and Titanium. **Ein Beitrag zur Bestimmung von Kupfer, Eisen, Aluminium und Titan.** Z. Šír and R. Přibil. *Collection of Czechoslovak Chemical Communications*, v. 21, no. 4, Aug. 1956, p. 866-872.

Indirect determination by means of pyridine solutions.

1901* (German.) Organosilicon Compounds. **Organosiliciumverbindungen. VI.** Silicon Determination in Organosilicon Compounds. **Die Bestimmung des Siliciums in Organosiliciumverbindungen.** Z. Šír and R. Komers. *Collection of Czechoslovak Chemical Communications*, v. 21, no. 4, Aug. 1956, p. 873-879.

Wet acidometric analytical method applicable to practically all organosilicon compounds.

1902* (Russian.) Simultaneous Determination of Oxygen and Halogens (Chlorine, Bromine, and Iodine) in Organic Substances. **Obnovremennoe opredelenie kisloroda i galoidov (khlora, broma i ioda) v organicheskikh soedineniiakh.** M. O. Korshun and E. A. Bondarevskaia. *Doklady Akademii Nauk SSSR*, v. 110, no. 2, Sept. 11, 1956, p. 220-222.

Describes a volumetric method and a table for the determination of halogen and O in the presence of paraffin.

1903* (German.) Paper Chromatographic Studies on Fatty Acids. **Papierchromatographische Untersuchugen von Fettsäuren.** M. Jáky. *Fette, Seifen, Anstrichmittel*, v. 58, no. 9, Sept. 1956, p. 721-727.

Application of the Kaufmann-Nitsch method.

1904* (German.) New Accessories for Paper Chromatography. **Neue Hilfsmittel für die Papierchromatographie.** E. von Arx and R. Neher. *Helvetica Chimica Acta*, v. 39, no. 6, 1956, p. 1664-1670.

Describes simple accessories for the rational production of a large number of analytical and sensitizing chromatograms.

1905 A Method for the Determination of the O^{18} Concentration of the Oxygen of Organic Compounds. D. Rittenberg and Laura Ponticorvo. *International Journal of Applied Radiation and Isotopes*, v. 1, no. 3, Nov. 1956, p. 208-214.

The compounds can be oxidized to yield CO_2 by $HgCl_2$ (or $CuCl_2$ or Cl_2) at 360-530 C. The CO_2 formed has the same O^{18} concentration as the original compound.

1906* Gas Chromatography in Plant Streams. David H. Fuller. *ISA Journal*, v. 3, Nov. 1956, p. 440-444.

Criteria for in-plant analyzers; basic theory of chromatography; plant stream analyzer; field unit; control room unit; selection of operating conditions; automatic control aspects.

1907* (English.) **A New Electrolytic Cell for the Isolation of Carbides and Non-Metallic Inclusions in Steel.** Nils Bäckström, Sakari Heiskanen, and Urpo Ilme. *Jernkontorets Annaler*, v. 140, no. 10, 1956, p. 812-816.

General requirements, design, and use.

1908 Quantitative Analysis in the 2-μ Region Applied to Synthetic Polymers. R. G. J. Miller and H. A. Willis. *Journal of Applied Chemistry*, v. 6, Sept. 1956, p. 385-391.

Short-wave spectroscopy in the examination and analysis of synthetic polymers is described with special reference to mol. wt. determination by end-group estimation, determination of monomer in polymers, and analysis of copolymers.

1909 Rapid Ion-Exchange Techniques for Radiochemical Separations. E. C. Campbell and E. Nelson. *Journal of Inorganic and Nuclear Chemistry*, v. 3, Oct. 1956, p. 233-242.

Short-lived nuclear isomers, Pb^{207m} (0.8 sec.) and Ir^{191m} (4.9 sec.) were identified and characterized after rapid anion-exchange separation from their long-lived parents, Bi^{207} (8 yrs.) and Os^{191} (16 days).

1910 Ion-Exchange Separations of the Lanthanides and Actinides by Elution With Ammonium Alpha-Hydroxy-Isobutyrate. H. Louise Smith and Darleane C. Hoffman. *Journal of Inorganic and Nuclear Chemistry*, v. 3, Oct. 1956, p. 243-247.

1911 Experimental Determination of Oxygen in Cupola-Melted Cast Iron. E. A. Loria, H. W. Lownie, Jr., and M. W. Mallett. *Journal of Metals*, v. 8, *American Institute of Mining and Metallurgical Engineers, Transactions*, v. 206, Dec. 1956, p. 1670-1672.

Analyses were made on metal and slag from melts made under normal and oxidizing conditions. From these data, relations were established between melting variables and composition of the cast iron.

1912 Gas Content of Solid Aluminum by Solid Extraction and Vacuum Fusion. James L. Brandt and C. Norman Cochran. *Journal of Metals*, v. 8; *American Institute of Mining and Metallurgical Engineers, Transactions*, v. 206, Dec. 1956, p. 1672-1674.

With properly prepared specimens, reproducible H contents of Al alloy samples can be secured by either method. Because of the rapidity with which analyses can be obtained, vacuum fusion has a decided advantage over solid extraction.

1913 Method for Spectrochemical Determination of Aluminum in Fe-Al Alloys. Edward F. Runge and Ford R. Bryan. *Journal of Metals*, v. 8; *American Institute of Mining and Metallurgical Engineers, Transactions*, v. 206, Dec. 1956, p. 1674-1676.

Procedure exhibits high precision and is adaptable to either photographic or direct reading instruments. It provides for the determination of Al in the concentration range between 8 and 16% and is designed for routine control purpose.

1914 (English.) **Studies on the Polarographic Analysis. XXIV. Use of Double Complexing Agents as Supporting Electrolyte. Pt. II. The EDTA-KCN Base Solution.** Masayoshi Ishibashi, Taitiro Fujinaga, and Masanori Sato. *Kyoto University, Institute for Chemical Research, Bulletin*, v. 34, Mar. 1956, p. 10-19.

1915 The Gravimetric Determination of Tantalum in Uranium-Tantalum Alloys. Owen H. Kriege and Ross D. Gardner. *Los Alamos Scientific Laboratory (U. S. Atomic Energy Commission)*, LA-2032, Apr. 1956, 20 p. (UF767 U3La Contin.)

Determination by acid hydrolysis or by precipitation with cupferron is accurate to within 1%.

1916* The Flame Photometric Determination of Lithium Using Infra-Red Barrier Layer Cells. H. J. Allsopp and P. M. Wingfield. *Metallurgia*, v. 54, no. 325, Nov. 1956, p. 255-259.

Double-beam instrument was modified to incorporate infra-red barrier-layer cells which have peak response in the region of the Li and K major lines.

1917 The Application of the Mass Spectrometer to the Analysis of Organic Compounds. J. D. Waldron. *Metropolitan-Vickers, Research Series No.* 29, July 1956, 10 p. (TK1 M56r Contin.)

Instrument is extensively used on a wide variety of problems both in industry, for the purpose of monitoring composition of plant streams, and in the research laboratory.

1918* A Complete Slag Analysis in 45 Minutes. W. T. Unfried. *Modern Castings*, v. 30, Dec. 1956, p. 32-34.

Total element present is determined and calculated to the percent of its most prominent form. Sample weights were chosen that can utilize standard laboratory solutions already prepared.

1919 Determination of Sr^{90} Activity in Water by Ion-Exchange Concentration. Charles W. Stanley and Paul Kruger. *Nucleonics*, v. 14, Nov. 1956, p. 114, 116-118.

1920 The Use of Trialkyl Phosphine Oxides as Extractants in the Fluorometric Determination of Uranium. J. C. White. *Oak Ridge National Laboratory (U. S. Atomic Energy Commission)*, ORNL-2161, Nov. 1956, 24 p. (UF767 U3o Contin.)

Tri-*n*-octyl and tri-*n*-decylphosphine oxides quantitatively extract U from solutions that are as concentrated as 12 molar with respect to such acids as sulfuric, phosphoric, and hydrochloric.

1921 Determination of Free Acid in Solutions of Uranyl Sulfate. Oscar Menis, D. L. Manning, and G. Goldstein. *Oak Ridge National Laboratory (U. S. Atomic Energy Commission)* ORNL-2178, Nov. 1956, 13 p. (UF767 Un3o Contin.)

Use of Sargent-Malmstadt automatic differential titrator whereby the inflection point of a potentiometric curve is automatically detected and used to turn off the buret.

1922 Spectrophotometry in Analysis of Oils and Fats. IV. N. H. E. Ahlers. *Paint Technology*, v. 20, Oct. 1956, p. 357-360.

Infra-red spectrometer analytical techniques. (To be continued.)

1923* Spectroscopic Investigation of Essential Oils. I. Quantitative Evaluation of Sandalwood Oil Through Infra-Red Spectroscopy. V. K. Balakrishnan, Sharda Dasgupta, and S. C. Bhattacharyya. *Perfumery and Essential Oil Record*, v. 47, Nov. 1956, p. 383-385.

1924 Fuel Gas Analysis by Chromatography? Vincent J. Coates and Nathaniel Brenner. *Petroleum Refiner*, v. 35, Nov. 1956, p. 197-201.

1925 High Sensitivity Mass Spectrometer for Noble Gas Analysis. John H. Reynolds. *Review of Scientific Instruments*, v. 27, Nov. 1956, p. 928-934.

Construction, performance, and background characteristics.

1926* (French.) A Contribution to the Methods of Analysis of Higher Boiling Petrol Fractions. **Contribution aux méthodes d'analyse de fractions supérieures de pétrole.** A. Crozier. *Revue de l'Institut Francais du Petrole et Annales des Combustibles Liquides*, v. 11, no. 8, Sept. 1956, p. 1129-1160.

Structural analysis was applied to pure hydrocarbons and petrol fractions distilling between 200 and 300 C.

1927* (French.) Determining Hydrogen in Liquid Steel. **Considérations relatives au dosage de l'hydrogène dans l'acier liquide.** M. Lacomble and A. Coune. *Revue Universelle des Mines*, v. 12, ser. 9, no. 11, Nov. 1956, p. 602-607.

The apparatus, working conditions and sampling methods used in determining H in steels. A study of the effect of sampling time on H content.

1928* (French.) Determining Phosphorus in Steels by Direct Spectrum Analysis. **Sur le dosage du phosphore dans les aciers par analyse spectrale directe.** A. Hans, M. Lacomble, and L. Charlet. *Revue Universelle des Mines*, v. 12, ser. 9, no. 11, Nov. 1956, p. 607-613.

The spectral difficulties in determining P were overcome by using a spectrograph provided with a precision grating and other special accessories. The Cu influence was eliminated and the spectral results confirmed by further chemical determination.

1929 Uranium Concentration Meter. Orville Arnett. *Union Carbide Nuclear Company (U. S. Atomic Energy Commission)*, Y-1144, Sept. 1956, 29 p. (UF767 Un3.1y Contin.)

One design analyzes samples containing U in the presence of other elements that emit γ-rays. Another analyzes samples containing only U as the γ-ray source.

1930 Radioanalysis of Krypton and Xenon and Its Use in Diffusion Experiments With Silver. J. Martin Tobin. *U. S. Atomic Energy Commission, Research and Development Report*, HW-43350, May 1956, 24 p. (UF767 Un3.1hw Contin.)

Necessary equipment; diffusion coefficients at 500, 600, 735, and 800 C.

1931 (German.) X-Ray Analysis of Metals. **Röntgenographie der Metalle.** M. W. Maltsev. VEB Verlag Technik, Berlin. 240 p. 1955. (TN690 M29r)

A textbook for students and engineers working in metallurgical mills and in machine-construction fields, where non-destructive tests of materials are applied. Detection of material flaws, qualitative and quantitative analysis, crystalline structure, and phase analysis of alloys.

1932* (Russian.) Precipitation of Columbium and Tantalum From Titanium by Selenious Acid. **Otdelenie niobiia i tantala ot titana selenistoi kislotoi.** I. P. Alimarin and E. I. Stepaniuk. *Zavodskaia Laboratoriia*, v. 22, no. 10, Oct. 1956, p. 1149-1153.

Selenious acid quantitatively precipitates Cb and Ta in tartaric-acid solutions containing HCl. Solubility of Ti selenite depends strongly on temperature, so that all operations must be carried out close to the boiling point.

1933* (Russian.) Present State of the Analytical Chemistry of Zirconium. **Sovremennoe sostoianie analiticheskoi khimii tsirkoniia.** V. G. Goriushina and V. M. Vladimirova. *Zavodskaia Laboratoriia*, v. 22, no. 10, Oct. 1956, p. 1171-1180.

Separation of Zr from other elements and methods for its determination.

See also: **1770** (biological analysis); **1984** (spectrophotometric determination of polyunsaturated acids); **1987** (analysis of petroleum); **2099** (determination of urea in coatings); **2427** (detection of Na with flame photometer); **3173** (wastes analysis); **3179** (analysis of air).

CHEMISTRY—INORGANIC AND GENERAL

1934 The Ammoniation, Ammonolysis and Hydrolysis of Aluminum(III) Iodide. George W. Watt and Juergen H. Braun. *American Chemical Society, Journal*, v. 78, Nov. 5, 1956, p. 5494-5496.

1935 The Oxidation of Arsenic(III) Fluoride With Bromine and Iodine. Howard M. Dess and Robert W. Parry. *American Chemical Society, Journal*, v. 78, Nov. 20, 1956, p. 5735-5737.

In the presence of almost equimolar amounts of water, AsF_3 is oxidized by Br to give $AsBr_3$, $HAsF_6$, and H_3AsO_4.

1936 Studies on the Chemistry of Halogens and of Polyhalides. VIII. On the Reaction of Iodine Halides With Aluminum Halides. Alexander I. Popov and Francis B. Stute. **IX. Electrical Conductance Study of Higher Polyiodide Complex Ions in Acetonitrile Solutions.** Alexander I. Popov, Ralph H. Rygg, and Norman E. Skelly. *American Chemical Society, Journal*, v. 78, Nov. 20, 1956, p. 5737-5744.

1937 Thermal Analysis of the Indium-Iodine System. E. A. Peretti. *American Chemical Society, Journal*, v. 78, Nov. 20, 1956, p. 5745-5746.

Presents complete phase diagram for the system. InI forms eutectic with In at 0.2 wt.% I and 155 C. Solubility of solid and liquid InI in In is low, and at 365 C a monotectic is formed with composition indistinguishable from that of InI.

1938 On the System: Bromine-Water. Clinton M. Kelley and H. V. Tartar. *American Chemical Society, Journal*, v. 78, Nov. 20, 1956, p. 5752-5756.

Measurements were made of the distribution of Br between CCl_4 and water and the vapor pressures of Br over CCl_4 solutions.

1939 Investigation of the Complexes of Mercury(II) With Ethylenediaminetetraacetic Acid Using the Mercury Electrode. James I. Watters, John G. Mason, and O. E. Schupp. *American Chemical Society, Journal*, v. 78, Nov. 20, 1956, p. 5782-5785.

1940* (French.) On the Sulfides and the Polysulfide of Cerium. **Sur les sulfures et le polysulfure de cérium.** Jean Flahaut and Micheline Guittard. *Comptes Rendus*, v. 243, no. 19, Nov. 5, 1956, p. 1419-1422.

A study of the relationship between α,β, and γ crystalline forms of cerous sulfide and their principal properties; description of the cubic cerous polysulfide.

1941 Reaction Calorimetry. The Hydrogenation of Organic Fluorides and Chlorides. J. R. Lacher, A. Kianpour, F. Oetting, and J. D. Park. *Faraday Society, Transactions*, v. 52, Nov. 1956, p. 1500-1508.

The calorimeters used operate isothermally by having the reaction heat transferred to a surrounding volatile liquid which is simultaneously being cooled by bubbling an inert gas through it.

1942 The Kinetics of Combination of Carbon Dioxide With Hydroxide Ions. B. R. W. Pinsent, L. Pearson, and F. J. W. Roughton. *Faraday Society, Transactions*, v. 52, Nov. 1956, p. 1512-1520.

1943* (Italian.) Methyl Copper. **Sul rame metile.** Giacomo Costa, Anna Maria Camus, and Ego Pauluzzi. *Gazzetta Chimica Italiana*, v. 86, no. 11, Nov. 1956, p. 997-1013.

A study of the precipitation, isolation, and purification of methyl copper, an insoluble reaction product of Pb $(CH_3)_4$ and $Cu(NO_3)_2 \cdot 3H_2O$ in absolute alcohol; CH_3 radicals were formed in the thermic decomposition, and some bands were recorded in the infra-red spectrum.

1944* (German.) Grinding Quartz Powder in the Presence of Organic Compounds. **Über das Mahlen von Quarzpulvern in Gegenwart organischer Verbindungen.** H. Deuel and R. Gentili. *Helvetica Chimica Acta*, v. 39, no. 6, 1956, p. 1586-1589.

Considers chemical reaction taking place between the newly formed surfaces and the organic molecules.

1945* (German.) The Complexes of the Rare Earths and the Gadolinium Break. **Die Komplexe der Seltenen Erdkationen und die Gadoliniumecke.** G. Schwarzenbach and R. Gut. *Helvetica Chimica Acta*, v. 39, no. 6, 1956, p. 1589-1599.

Stability constants of complexes of nitrilotriacetic acid with La, Ce, Pr, Nd, Sm, Gd, Dy, Yb, and Y were polarographically determined.

1946 The Relative Stabilities of Some Molecular Addition Compounds of Boron. W. A. G. Graham and F. G. A. Stone. *Journal of Inorganic and Nuclear Chemistry*, v. 3, Oct. 1956, p. 164-177.

1947 Thioiodide Formation by Phosphorus. R. D. Topsom and C. J. Wilkins. *Journal of Inorganic and Nuclear Chemistry*, v. 3, Oct. 1956, p. 187-189.

Only $P_4S_3I_2$ could be prepared.

1948 The Reaction of Cobalt(II) Bromide With Lithium Borohydride and Lithium Aluminohydride. Albert C. Stewart and George W. Schaeffer. *Journal of Inorganic and Nuclear Chemistry*, v. 3, Oct. 1956, p. 194-197.

1949 Alizarin Sulphonate Complexes of Zirconium and Hafnium. Edwin M. Larsen and Stanley T. Hirozawa. *Journal of Inorganic and Nuclear Chemistry*, v. 3, Oct. 1956, p. 198-205.

Reaction of alizarin S with dilute Zr and Hf solutions in 0.1 M $HClO_4$ was studied amperometrically.

1950* (French.) A Contribution to the Study of the Chemistry of Scandium. **Contribution a l'étude de la chimie du scandium.** Vasudeva K. Iyà. *Journal des Recherches du Centre National de la Recherche Scientifique*, 1956, no. 35, June 1956, p. 91-111.

A method for rapid decomposition of thortvéitite. Metallic Sc was obtained by heating in high vacuum. Further distillation gave extremely pure Sc, the properties of which are described.

1951 Optical Properties and X-Ray Diffraction Data for Some Inorganic Fluoride and Chloride Compounds. H. Insley, T. N. McVay, R. E. Thoma, and G. D. White. *Oak Ridge National Laboratory (U. S. Atomic Energy Commission)*, ORNL-2192, Nov. 1956, 65 p. (UF767 U3o Contin.)

1952 The Newest Synthetic Elements. Albert Ghiorso and Glenn T. Seaborg. *Scientific American*, v. 195, Dec. 1956, p. 67 + 10 pages.

The discovery of elements 98 through 101.

1953* (German.) Solutions of Germanium (IV)-Oxide in Inorganic Acids. **Lösungen von germanium (IV)-oxyd in anorganischen Säuren.** G. Brauer and H. Müller. *Zeitschrift für Anorganische und Allgemeine Chemie*, v. 287, nos. 1-2, Sept. 1956, p. 71-86.

The varying solubility of GeO_2 in different acids was measured between 1 M acid concentrations and the highest ones at 25 C.

1954* (Russian.) Complex Compounds of Divalent Cobalt With Hydrazine and Hydrazincarboxylic Acid. **Kompleksnye soedineniia dvukhvalentnogo kobalta s gidrazinom i gidrazinkarbanovoi kislotoi.** P. V. Gogorishvili, M. V. Karkarashvili, and L. D. Tsitsishvili. *Zhurnal Neorganicheskoi Khimii*, v. 1, no. 8, 1856, p. 1731-1738.

Study of the properties of compounds resulting from reactions of $Co(N_2H_4)_2Cl_2$ and N_2H_3COOH, $[Co(NH_3)_5Cl_2]Cl_2$ and $H_2N_2COOH + N_2H_4$, and HCl and $(N_2H_3COO)_2CoN_2H_4$.

1955* (Russian.) The Products of the Reaction of Zirconium Tetrachloride and Hafnium Tetrachloride With Phosphorous Oxychloride. **K voprosu o produktakh vzaimodeistviia tetrakhloridov tsirkoniia i gafniia s khlorokis'iu fosfora.** L. A. Nisel'son and B. N. Ivanov-Emin. *Zhurnal Neorganicheskoi Khimii*, v. 1, no. 8, 1956, p. 1766-1770.

Reaction of $ZnCl_4$ and $POCl_3$ results in $3ZrCl_4 \cdot 2POCl_3$. This compound and the distilled product of the reaction of $HfCl_4$ with $POCl_3$ are azeotropic.

1956* (Russian.) The Reactions of Salts With Metals in the Molten State. The Reaction of CuCl With Zinc. **Reaktsii solei s metallami v rasplavlennom sostoianii. O vzaimodeistvii CuCl s tsinkom.** A. N. Palkin and G. P. Chepurko. *Zhurnal Neorganicheskoi Khimii*, v. 1, no. 8, 1956, p. 1832-1842.

A study of the substitution reaction $Cu_2Cl_2 + Zn = ZnCl_2 + 2Cu$.

CHEMISTRY—ORGANIC

1957* (English.) **The Reaction Between Phenols and Orthoesters. A New Synthesis of Aryl Alkyl Ethers.** Bengt Smith. *Acta Chemica Scandinavica*, v. 10, no. 6, 1956, p. 1006-1010.

Alkyl orthocarbonates and phenols react under very mild conditions with the formation of aryl alkyl ethers.

1958* (English.) **Syntheses in Dimethylhydrazoniumethyl Esters of Aliphatic Dicarboxylic Acids.** L.-E. Tammelin. *Acta Chemica Scandinavica*, v. 10, no. 7, 1956, p. 1068-1070.

The bis-(ω-bromoethyl)-esters of oxalic, malonic, succinic, glutaric, and adipic acids were prepared.

1959* (English.) ***iso*Thiocyanates. XIX. L(-)-5-Methylsulphinylpentyl *iso*Thiocyanate, the Aglucone of a New Naturally Occurring Glucoside (Glucoalyssin).** Anders Kjaer and Rolf Gmelin. *Acta Chemica Scandinavica*, v. 10, no. 7, 1956, p. 1100-1110.

Isolation from seeds of the crucifier *Alyssum argenteum* Vitm.; thiourea derivatives; structure and properties.

1960* (English.) **The Synthesis of Some Organosilicon Alcohols. I.** Sune Brynolf. *Acta Chemica Scandinavica*, v. 10, no. 7, 1956, p. 1143-1145.

The only Si containing alcohol isolated from reaction between propylene oxide and trimethylsilylmethylmagnesium bromide was 4-trimethylsilyl-butanol-2.

1961* (English.) **Studies on the Interaction of Paraffin-Chain Alcohols and Association Colloids. VII. Microscopic Investigation of the Interaction Between Some Liquid Alcohols and Sodium Laurate Solutions.** Per Ekwall, Milan Salonen, Ingmar Krokfors, and Ingvar Danielsson. **VIII. The Solubility of Decanol-1 in Soap Solutions Below the C. M. C.** Per Ekwall and Tuure Vittasmäki. *Acta Chemica Scandinavica*, v. 10, no. 7, 1956, p. 1146-1159, 1177-1191.

1962* (English.) **Studies on Monoalkyl Carbonates. XIV. The Monoalkyl Carbonates of Sorbitol, Mannitol and Glucose.** Jørn Thamsen. *Acta Chemica Scandinavica*, v. 10, no. 7, 1956, p. 1165-1176.

Equilibrium conditions and reaction mechanism for formation and decomposition.

1963 Pyrolysis of Allyl Chloride. L. M. Porter and F. F. Rust. *American Chemical Society, Journal*, v. 78, Nov. 5, 1956, p. 5571-5573.

Products are shown to arise as a consequence of association reactions of allyl and chloroallyl radicals followed by cyclization. Alteration of reaction paths and products by adding propylene or toluene to the decomposing allyl chloride is described.

1964 Preparation of Esters From the Reaction of Alkyl Orthosilicates With Organic Acids. Gene Sumrell and George E. Ham. *American Chemical Society, Journal*, v. 78, Nov. 5, 1956, p. 5573-5575.

1965 The Dimerization of Acetyl Cyanide. Bryce E. Tate and Paul D. Bartlett. *American Chemical Society, Journal*, v. 78, Nov. 5, 1956, p. 5575-5580.

Over-all dimerization is subject to basic catalysis because both cyanohydrin formation and acetylation are catalyzed by bases. Competing reactions are minimized by an excess of HCN which converts a maximum of the acetyl cyanide into the cyanohydrin.

1966 Primary and Secondary Isotope Effects in the Enolization of Ketones. William D. Emmons and M. Frederick Hawthorne. *American Chemical Society, Journal*, v. 78, Nov. 5, 1956, p. 5593-5596.

1967 Telomers From Carbon Monoxide and Olefins. R. E. Foster, A. W. Larchar, R. D. Lipscomb, and B. C. McKusick. *American Chemical Society, Journal*, v. 78, Nov. 5, 1956, p. 5606-5611.

Copolymerization of olefins and CO in the presence of active telogens. Products are aldehydes, ketones, or derivatives of acids.

1968 The Structure of Quinone-Donor Adducts. I. The Action of Triphenylphosphine on *p*-Benzoquinone, 2,5-Dichloro-*p*-Benzoquinone and Chloranil. Fausto Ramirez and Samuel Dershowitz. *American Chemical Society, Journal*, v. 78, Nov. 5, 1956, p. 5614-5622.

1969 A Novel Stereospecific Synthesis of Hydrophenanthrones. Ernest Wenkert and Travis E. Stevens. *American Chemical Society, Journal*, v. 78, Nov. 5, 1956, p. 5627-5631.

A new synthetic scheme, leading stereospecifically in only four steps from the Reimer-Tiemann product of 4-methyl-l-naphthol to a hydrophenthrone.

1970 The Isomerism of Dithiolphthalates. John C. Sheehan and Gerald F. Holland. *American Chemical Society, Journal*, v. 78, Nov. 5, 1956, p. 5631-5633.

Both possible isomeric structures were obtained in pure form and structures assigned on the basis of infra-red spectra.

1971 The Conditions for Optical Inactivity. Synthesis of an Image-Superposable Molecule Which Contains No Plane or Center of Symmetry. G. E. McCasland and Stephen Proskow. *American Chemical Society, Journal*, v. 78, Nov. 5, 1956, p. 5646-5652.

1972 The Products of Addition of Sulfenyl Halides to Norbornene. Harold Kwart and Robert K. Miller. *American Chemical Society, Journal*, v. 78, Nov. 5, 1956, p. 5678-5685.

Products were identified by various degradative procedures. An effect on the product composition due to solvent medium of reaction was observed.

1973 Reactions of 2-Iodobutane With Iodine. Evidence for a Radical Reaction With Inversio of Carbon. Raymond A. Herrmann and Richard M. Noyes. *American Chemical Society, Journal*, v. 78, Nov. 20, 1956, p. 5764-5769.

Optically active 2-iodobutane undergoes I catalyzed racemization and also exchanges with isotopically labeled elementary I. The two simultaneous thermal reactions were studied between 130 and 170 C in hexachlorobutadiene-1,3.

1974 Organic Ions in the Gas Phase. I. The Cationated Cyclopropane Ring. Paul N. Rylander and Seymour Meyerson. *American Chemical Society, Journal*, v. 78, Nov. 20, 1956, p. 5799-5802.

Labeled *t*-butylbenzene and 3-ethyl-3-phenylpentane was synthesized and the mass spectra of these and of the corresponding unlabeled compounds was recorded.

1975 The Reaction of Isobutylamine With Nitrous Acid. π-Complex and the Bridged-Protonium Ion. Lawrence G. Cannell and Robert W. Taft, Jr. *American Chemical Society, Journal*, v. 78, Nov. 20, 1956, p. 5812-5817.

1976 Analogs of Hexaphenylethane. V. Triphenylsilyltriphenylgermane. Henry Gilman and Clare W. Gerow. *American Chemical Society, Journal*, v. 78, Nov. 20, 1956, p. 5823-5824.

This compound is inert toward O in refluxing xylene and toward I in refluxing $CHCl_3$. It is largely unaffected by I in refluxing xylene and is cleaved by Na-K alloy in diethyl ether.

1977 Some Reactions of 1,4-Diselenane. Edwin S. Gould and Wm. Burlant. *American Chemical Society, Journal*, v. 78, Nov. 20, 1956, p. 5825-5826.

Oxidation with 32% peroxyacetic acid yields both 1,4-diselenane dioxide and *trans*ethanediseleninic anhydride. Treatment with excess methyl iodide gives a nonomethylated cyclic selenonium salt.

1978 Equilibrium Constants for Pyridinium Iodide Charge-Transfer Complex Formation. Edward M. Kosower and John C. Burbach. *American Chemical Society, Journal*, v. 78, Nov. 20, 1956, p. 5838-5842.

Comparison of absorption curves for the complex in ethanol and water indicates that the absorption band is shifted to longer wave lengths in solvents of lower solvating ability.

1979 Syntheses of Some Substituted Indole-3-Acetic Acids. Milon W. Bullock and John J. Hand. *American Chemical Society, Journal*, v. 78, Nov. 20, 1956, p. 5852-5854.

A series of ethyl 2-methylindole-3-acetates having substituents in the benzene ring were prepared by a Fischer indole ring closure of the corresponding ethyl levulinate substituted phenylhydrazones.

1980 The Isolation and Characterization of a Pteridine Required for the Growth of *Crithidia Fasciculata*. E. L. Patterson, M. H. von Saltza, and E. L. R. Stokstad. *American Chemical Society, Journal*, v. 78, Nov. 20, 1956, p. 5871-5873.

Procedures are described for the isolation of a compound named biopterin. These involved adsorption on charcoal, counter-current solvent distribution and partition chromatography. Pure biopterin crystallized from water in plae yellow spheres.

1981 Reduction of the Products of Periodate Oxidation of Carbohydrates. II. A New Method for the End-Group Assay of Amylopectin. III. The Constitution of Amylopectin. J. K. Hamilton and F. Smith. *American Chemical Society, Journal*, v. 78, Nov. 20, 1956, p. 5907-5912.

Amylopectin was subjected to prolonged periodate oxidation with sodium periodate and the polyaldehyde so formed reduced with sodium borohydride to the corresponding polyalcohol. Oxidations were carried out at high concentration of periodate and at different temperatures for varying lengths of time.

1982 The Detosylation of 1,4:3,6-Dianhydrohexitol Ditosylates and Syntheses of 1,4:2,5:3,6-Trianhydro-*D*-Mannitol. Arthur C. Cope and T. Y. Shen. *American Chemical Society, Journal*, v. 78, Nov. 20, 1956, p. 5912-5916.

Two *exo*-tosylate groups were removed by treatment with barium methoxide, forming the dianhydride with retention of configuration.

1983 The Benzilic Ester Rearrangement. W. von E. Doering and R. S. Urban. *American Chemical Society, Journal*, v. 78, Nov. 20, 1956, p. 5938-5942.

In benzene solution where, from freezing point measurement, it appears to be present as the tetramer, K *t*-butylate effects the rearrangement very rapidly in high yield in a second-order reaction.

1984 Isomerization of Linoleic, Linolenic, and Other Polyunsaturated Acids With Potassium Tertiary Butoxide and Its Application in the Spectrophotometric Estimation of These Acids. B. Sreenivasan and J. B. Brown. *American Oil Chemists' Society, Journal*, v. 33, Nov. 1956, p. 521-526.

1985 Hydrocarbons in the 126° to 132° C. Fraction of Petroleum. Morton B. Epstein, Charles B. Willingham, Beveridge J. Mair, and Frederick D. Rossini. *Analytical Chemistry*, v. 28, Dec. 1956, p. 1924-1927.

Concentration, identification, and physical properties of seven compounds.

1986 Relationship Between Carbon-Type Composition, Viscosity-Gravity Constant, and Refractivity Intercept of Viscous Fractions of Petroleum. Stewart S. Kurtz, Jr., Richard W. King, William J. Stout, Dorothy G. Partikian, and E. A. Skrabek. *Analytical Chemistry*, v. 28, Dec. 1956, p. 1928-1936.

A triangular graph developed is useful in following the effect of solvent extraction, acid treating, hydrogenation of the viscous fractions of petroleum, and for comparing the composition of the viscous fractions from various crude oils.

1987 Determination of Saturated Hydrocarbons in Heavy Petroleum Fractions by Mass Spectrometry. H. E. Lumpkin. *Analytical Chemistry*, v. 28, Dec. 1956, p. 1946-1948.

1988* (German.) Micro-Zone Melting Process for the Purification of Organic Substances. **Mikro-Zonenschmelzverfahren zur Reinigung organischer Substanzen.** G. Hesse and H. Schildknecht. *Angewandte Chemie*, v. 68, no. 20, Oct. 21, 1956, p. 641-643.

The zone melting process is also suitable for the purification of solid organic substances.

1989* (English.) **Methodological Studies of Zone-Electrophoresis in Vertical Columns. I. Fractionation in Cellulose Powder Columns of Substances of Low Molecular Weight Exemplified by Amino Acids and Related Compounds.** Jerker Porath. *Biochimica et Biophysica Acta*, v. 22, no. 1, Oct. 1956, p. 151-175.

Details of apparatus and operation.

1990 Organic Compounds of Boron. M. F. Lappert. *Chemical Reviews*, v. 56, Oct. 1956, p. 959-1064.

Preparation and properties of organic derivatives of borine and polymers of these.

1991 The Mesomorphic Behavior of the Fatty Esters of Cholesterol. G. W. Gray. *Chemical Society, Journal*, 1956, Oct. 1956, p. 3733-3739.

Melting points and mesomorphic transition temperatures were determined.

1992 Studies in Peroxidase Action. XI. The Oxidation of a Mixture of Amines. G. M. K. Hughes and B. C. Saunders. *Chemical Society, Journal*, 1956, Oct. 1956, p. 3814-3820.

Compounds of "intermediate" structure were obtained.

1993 Synthetic and Oxidative Studies in the Polyhydroxydiphenyl Series. II. 5 : 6-Dichloro-2 : 3-Dihydroxydiphenyl. III. 2 : 3-Dihydroxy-5 : 6-Dimethyldiphenyl. J. Malcolm Bruce and F. K. Sutcliffe. *Chemical Society, Journal*, 1956, Oct. 1956, p. 3820-3829.

Preparation and properties.

1994 Intramolecular Acylation. I. Ring Closure of Some β-(7-Alkyl-1-Naphthyl) Propionic Acids. A. J. M. Wenham and J. S. Whitehurst. *Chemical Society, Journal*, 1956, Oct. 1956, p. 3857-3863.

Cyclization of propionic acids and of their acid chlorides gives only the products of *peri*-ring closure.

1995 The Reaction of Oximes With *iso*Propyl Methylphosphono-Fluoridate (Sarin). A. L. Green and B. Saville. *Chemical Society, Journal*, 1956, Oct. 1956, p. 3887-3892.

Mechanism of the reaction; effect of structure on reactivity of different oximes.

1996 Properties and Applications of Sequestering Agents. R. L. Smith. *Chemistry & Industry*, 1956, no. 44, Nov. 10, 1956, p. 1284-1291.

1997 Production and Organic Chemistry of Chelating Agents. J. K. Aiken. *Chemistry & Industry*, 1956, no. 45, Nov. 17, 1956, p. 1334-1338.

1998* (French.) About Some New Iodocoumarins. **Sur quelques iodocoumarines nouvelles.** N. P. Buu-Hoï, T. Ba. Loc, and N. Dat Xuong. *Comptes Rendus*, v. 243, no. 16, Oct. 15, 1956, p. 1126-1129.

A series of new iodocoumarins were synthesized with various functional groupings in their molecules. The possibility of using them as opaquing agents in radiology was considered.

1999* (Russian.) Thermal Stability of Complexes of *n*-Paraffin Hydrocarbons With Urea. **Termicheskaia ustoichivost' kompleksov n-parafinovykh uglevodorodov s mochevinoi.** L. M. Rozenberg, E. M. Terent'eva, N. A. Nechitailo, and A. V. Topchiev. *Doklady Akademii Nauk SSSR*, v. 109, no. 6, Aug. 21, 1956, p. 1144-1147.

Formation of complexes of urea with *n*-paraffins, alcohols, and ketones. Temperature limits of decomposition and temperature dependence of decomposition on the number of *n*-carbon atoms.

2000* (Russian.) Some Derivatives of Disilanepropane. **Nekotorye proizvodnye disilanpropana.** A. V. Topchiev, N. S. Nametkin, T. I. Chernysheva, and S. G. Durgar'ian. *Doklady Akademii Nauk SSSR*, v. 110, no. 1, Sept.-Oct. 1956, p. 97-100.

A study of the reaction of various allyl silanes with Si compounds containing a Si-H bond.

2001 Raman Spectrum of Phosphonium Iodide. Relation Between Bond-Stretching Force Constant and Bond Length in Isoelectronic Species of Type XH_4. L. A. Woodward and H. L. Roberts. *Faraday Society, Transactions*, v. 52, Nov. 1956, p. 1458-1461.

The bond-stretching force constant k and the bond length R are shown to be related by the simple empirical rule $k R^3$=constant.

2002* (German.) Hydrolysis of an Amide Bond Accelerated by Cu^{2+}. **Über eine durch Cu^{2+} beschleunigte Amidspaltung.** Iphigenia Photaki, S. Fallab, and H. Erlenmeyer. *Helvetica Chimica Acta*, v. 39, no. 6, 1956, p. 1484-1486.

2003 The 'Kettle-Wax' Phase in Soap Systems: Dilatometric Study of the Systems Sodium Laurate-Water and Sodium Laurate-Sodium Chloride-Water. Sundar L. Aggarwal, N. R. Sanjana, and J. W. McBain. *Journal of Applied Chemistry*, v. 6, Sept. 1956, p. 391-399.

Boundary of the kettle-wax phase, which is capable of existing above 80-90 C was delimited. The importance of this phase in determining various equilibria in soap boiling is discussed.

2004 The Unique Properties of 2,4-Dinitro-Benzenesulfenyl Chloride. Norman Kharasch. *Journal of Chemical Education*, v. 33, Nov. 1956, p. 585-591.

2005 Ultrasonic Studies of Saturated Hydrocarbons at Low Temperatures. Jessie M. Young and A. A. Petrauskas. *Journal of Chemical Physics*, v. 25, Nov. 1956, p. 943-948.

Ultrasonic propagation properties of 2-methylbutane, 3-methylpentane, *n*-pentane, 2,3-dimethylbutane, and 2,2-dimethylbutane.

2006* (French.) The Tanning of Gelatin With Formaldehyde. **Tannage de la gélatine par l'aldehyde formique.** Jacques Pouradier and Henri Chateau. *Journal de Chimie Physique*, v. 53, no. 9, Sept. 1956, p. 726-731.

The gelling factors acting on a gelatin solution. Reaction results were interpreted in relation to the intermolecular and intramolecular bridges formed.

2007* (German.) Condensation of 4-Vinylpyridine and 2-Methyl-6-Vinylpyridine With Primary and Secondary Amines. **Über die Kondensation von 4-Vinylpyridin und 2-Methyl-6-vinylpyridin mit primären und sekundären Aminen.** Elmar Profft. *Journal für Praktische Chemie*, v. 4, nos. 1-2, Oct. 1956, p. 19-34.

With aliphatic, aromatic, and heterocyclic amines as well as secondary and primary amines, 4-vinylpyridine and 2-methyl-6-vinylpyridine reacted.

2008* (German.) Addition Compounds of Titanium Phenoxide. **Über Additionsverbindungen des Titanphenolates.** H. Funk and R. Masthoff. *Journal für Praktische Chemie*, v. 4, nos. 1-2, Oct. 1956, p. 35-42.

Titanium phenoxide complexes were produced from $Ti(OC_6H_5)_4 \cdot C_6H_5OH$. Molecular weight was determined by the cryoscopic method.

2009* (French.) Preparation of Analogous Phosphonic Acids Containing Various Cyto-Active Substances. Growth Regulators for Plants. **Préparation d'acides phosphoniques analogues a diverses substances cytoactives régulateurs de croissance des végétaux.** Prodomos Craniadès. *Journal des Recherches du Centre National de la Recherche Scientifique*, 1956, no. 35, June 1956, p. 119-148.

Preparation of organophosphoric acids. Twenty new compounds were prepared which had positive action on plant growth.

2010 Organic Syntheses. N. J. Leonard, editor. v. XXXVI. 120 p. 1956. John Wiley & Sons, New York. (QD262 Or3s Vis.)

Preparation and properties of 35 organic chemicals.

2011 The Examination of Waxes. C. L. Jones. *Paint Technology*, v. 20, Oct. 1956, p. 361-364.

Physical methods of examining waxes and wax-containing materials. (To be continued.)

2012* (Japanese.) **The Constitution of Oryzanol. I. Saponification Products.** Tomotaro Tsuchiya, Akio Kato, and Takuji Endo. *Reports of the Government Chemical Industrial Research Institute, Tokyo*, v. 51, no. 10, Oct. 1956, p. 359-363.

2013 The Gaseous Oxidation of Aliphatic Alcohols. I. Ethyl Alcohol: The Products Formed in the Early Stages. C. F. Cullis and E. J. Newitt. *Royal Society, Proceedings*, v. 237, ser. A, Nov. 20, 1956, p. 530-542.

2014 New Thickener for Glycerine. Louis Cohen. *Soap and Chemical Specialties*, v. 32, Nov. 1956, p. 42-45, 172, 174.

Improved viscosity through the use of "Carbopol 934" suggests new applications for glycerine. (To be continued.)

2015 Control of Bacterial Spoilage of Emulsion Oils. II. E. O. Bennett. *Soap and Chemical Specialties*, v. 32, Nov. 1956, p. 46-48, 155.

Compounds that are effective against aerobic microorganisms and those which are not, are listed in separate tables with concentrations used.

2016* (English.) **Iron-Catalyzed Oxidation in Hydrocarbons.** Andrew Gemant. *Zeitschrift für Physikalische Chemie (Frankfurt)*, v. 9, nos. 3-4, Nov. 1956, p. 245-258.

Oxidation in the presence of small amounts of soluble iron compounds is studied.

See also: **1860** (pentaerythritol); **2034** (hydrogenation of fatty esters); **2361** (hydrocarbon fuels); **2470** (characteristics of bitumens).

CHEMISTRY—PHYSICAL

2017* (English.) **Comparative Crystal Field Studies. II. Nickel(II) and Copper(II) Complexes With Polydentate Ligands and the Behaviour of the Residual Places for Co-Ordination.** Chr. Klixbüll Jørgensen. *Acta Chemica Scandinavica*, v. 10, no. 6, 1956, p. 887-910.

2018* (English.) **Equilibrium Studies of Polyanions. I. Isopolyvanadates in Acidic Media.** F. J. C. Rossotti and Hazel Rossotti. *Acta Chemica Scandinavica*, v. 10, no. 6, 1956, p. 957-984.

2019* (English.) **Determination of the Distribution Constant of a Compound Reacting With One of the Phases.** Lennart Larsson. *Acta Chemica Scandinavica*, v. 10, no. 7, 1956, p. 1071-1076.

Application of the formula is illustrated by the distribution of 2-methoxy-ethyl nicotinate between xylene and water.

2020* (English.) **The First Step in the Swelling of Gelatin With Water. II.** Chr. Winther. *Acta Chemica Scandinavica*, v. 10, no. 7, 1956, p. 1124-1131.

The two steps of absorption of water into the Christenson-interference plate, the final amount being the same as in the corresponding chromated gelatin plate. Diffusion is independent of the degree of hardening.

2021* (English.) **The Diffusion of an Electrolyte Solution in a Superimposed Electric Field.** Ole Lamm. *Acta Chemica Scandinavica*, v. 10, no. 7, 1956, p. 1132-1142.

2022 Fluorobenzene: Thermodynamic Properties in the Solid, Liquid and Vapor States; a Revised Vibrational Assignment. D. W. Scott, J. P. McCullough, W. D. Good, J. F. Messerly, R. E. Pennington, T. C. Kincheloe, I. A. Hossenlopp, D. R. Douslin, and Guy Waddington. *American Chemical Society, Journal*, v. 78, Nov. 5, 1956, p. 5457-5463.

Studies by low temperature calorimetry, comparative ebulliometry, flow calorimetry, and combustion calorimetry led to values of the standard entropy, heat capacity, and heat of formation of the vapor.

2023 Benzenethiol: Thermodynamic Properties in the Solid, Liquid and Vapor States; Internal Rotation of the Thiol Group. D. W. Scott, J. P. McCullough, W. N. Hubbard, J. F. Messerly, I. A. Hossenlopp, F. R. Frow, and Guy Waddington. *American Chemical Society, Journal*, v. 78, Nov. 5, 1956, p. 5463-5468.

Calorimetric results were used with molecular structure information to evaluate the contributions of internal rotation and anharmonicity to the thermodynamic functions.

2024 Cycloheptane, Cyclooctane and 1,3,5-Cycloheptatriene. Low Temperature Thermal Properties, Vapor Pressure and Derived Chemical Themodynamic Properties. H. L. Finke, D. W. Scott, M. E. Gross, J. F. Messerly, and Guy Waddington. *American Chemical Society, Journal*, v. 78, Nov. 5, 1956, p. 5469-5476.

2025 The Vapor Pressure and Heat of Sublimation of Chromous Iodide. The Chromium-Iodine Bond Energy in Chromous Iodide. Thomas L. Allen. *American Chemical Society, Journal*, v. 78, Nov. 5, 1956, p. 5476-5478.

Vapor pressure of CrI_2 was determined from 943 to 1054 K. Average bond energy found was 55.7 kcal. per mole.

2026 Models Relating Molecular Reactivity and Diffusion in Liquids. Richard M. Noyes. *American Chemical Society, Journal*, v. 78, Nov. 5, 1956, p. 5486-5490.

Data suggest that diffusion in liquids involves almost continuous motion and small individual displacements, and does not involve "jumps" of the order of a molecular diameter that are opposed by significant potential barriers.

2027 The Equilibria of the Metastable Crystalline Form of Beryllium Hydroxide. Be(OH)$_2$ in Hydrochloric Acid, Perchloric Acid and Sodium Hydroxide Solutions at 25°. R. A. Gilbert and A. B. Garrett. *American Chemical Society, Journal*, v. 78, Nov. 5, 1956, p. 5501-5505.

The hydrolysis constant given is believed to represent an upper limit in view of the polynuclear ions reported present.

2028 A Rapid Electrochemical Method for the Determination of Metal Chelate Stability Constants. R. W. Schmid and Charles N. Reilley. *American Chemical Society, Journal*, v. 78, Nov. 5, 1956, p. 5513-5518.

Formation of various bimetal compounds derived from mercuric ethylenediaminetetraacetate. Applicability of Hg electrode as a *p*M indicator electrode.

2029 Applications of Coulometric Methods to Kinetic Studies. Paul S. Farrington and Donald T. Sawyer. *American Chemical Society, Journal*, v. 78, Nov. 5, 1956, p. 5536-5542.

Through coulometric generation of reactants, rate constants can be determined rapidly and precisely. New technique for determination of rates of hydrolysis for aliphatic esters was developed.

2030 The Oxidation of Lower Paraffin Hydrocarbons. II. Observations on the Role of Ozone in the Slow Combustion of Isobutane. Clarence C. Schubert and Robert N. Pease. *American Chemical Society, Journal*, v. 78, Nov. 5, 1956, p. 5553-5556.

2031 The Zinc Chloride-Catalyzed Reaction of Polymethylbenzenes With Iodine Monochloride in Acetic Acid Solution. R. M. Keefer and L. J. Andrews. *American Chemical Society, Journal*, v. 78, Nov. 5, 1956, p. 5623-5627.

Nuclear iodination of the aromatic substances occurs by a process which is first order with respect to each reactant and to the catalyst. In the absence of catalyst the reactions are self-inhibiting.

2032 Principles of Phosphorus Chemistry. I. Some Generalities Concerning Multiple Bonding. John R. Van Wazer. **II. Nuclear Magnetic Resonance Measurements.** John R. Van Wazer, Clayton F. Callis, James N. Shoolery, and Robert C. Jones. *American Chemical Society, Journal*, v. 78, Nov. 20, 1956, p. 5709-5726.

Results are interpreted as showing an average of ¼ to ½ π-bond per σ-bond leading from a P atom. In available compounds in which P shares electrons with three other atoms, π-bonding is small or non-existent. Resonance spectra of 200 compounds were examined.

2033 The Hydrolytic Polymerization of Zirconium in Perchloric Acid Solutions. A. J. Zielen and Robert E. Connick. *American Chemical Society, Journal*, v. 78, Nov. 20, 1956, p. 5785-5792.

Up to 0.02 *M* Zr concentrations the data could be interpreted in terms of trimers and at least one higher polymer-probably tetramers. Their average degree of hydrolysis was found to correspond to about 4 and 8 hydroxide groups, respectively.

2034 The Kinetics of the Hydrogenation of Pure Fatty Esters. II. Mono-Olefinic Systems: Cis-Trans Isomerism. Franz A. Vandenheuvel. *American Oil Chemists' Society, Journal*, v. 33, Nov. 1956, p. 531-535.

2035 Theory of Countercurrent Distribution in Solvent Systems Near a Critical Point. C. A. Hollingsworth, J. J. Taber, and B. F. Daubert. *Analytical Chemistry*, v. 28, Dec. 1956, p. 1901-1906.

In systems to which the theory applies, the relative behavior of a pair of solutes can be characterized by a constant, γ, which is independent of the temperature or the third solvent component.

2036 Determination of Specific Surface Area of Colloidal Silica by Titration With Sodium Hydroxide. George W. Sears, Jr. *Analytical Chemistry*, v. 28, Dec. 1956, p. 1981-1983.

2037* On Chemical Surface Reactions in Hydrodynamic Flows. Paul L. Chambré. *Applied Scientific Research*, v. 6, sec. A, nos. 2-3, 1956, p. 97-113.

Deals with heterogeneous surface reactions in hydrodynamic flows in which the interface is a solid surface which acts catalytically and retains its structure and geometric characteristics throughout the reaction history.

2038* (Russian.) Study of Systems of Liquid Salts on a Thorium Fluoride Base. **Issledovanie sistem rasplavlennykh solei na osnove ftorida toriia.** V. S. Emel'ianov and A. M. Evstiukhin. *Atomnaia Energiia*, 1956, no. 4, p. 107-112.

Thermal and phase X-ray analysis of the system ThF_4-NaCl-KCl. This information useful in obtaining Th by electrolysis. Salts were melted in an argon atmosphere.

2039 Hydrogenation Activity and Surface Area of Pulverized Nickel, Cobalt, Iron, and Copper Catalysts and Mixed Catalysts. G. Rienäcker and S. Unger. *Henry Brutcher Translation No.* 3824, 30 p. (From *Zeitschrift Anorg. Allgem. Chemie*, v. 274, 1953, p. 48-71.) Henry Brutcher, Altadena, Calif.

Previously abstracted from original. See item 7760, v. 3, June 1954.

2040* Volume Changes on Mixing in the Cyclohexane-*n*-Heptane-Benzene System. Manoj Kumar D. Sanghvi and Webster B. Kay. *Chemical Engineering Science*, v. 6, Oct. 1956, p. 10-25.

The experimental results are represented satisfactorily by equations based on the theory of regular solutions.

2041* Mass Transfer Between a Flat Surface and a Falling Liquid Film. H. Kramers and P. J. Kreyger. *Chemical Engineering Science*, v. 6, Oct. 1956, p. 42-48.

Measurements were performed on the rate of solution of rather short surfaces of benzoic acid in a water film in laminar and turbulent flow.

2042 The Crystallization of Flexible Polymer Molecules. Leo Mandelkern. *Chemical Reviews*, v. 56, Oct. 1956, p. 903-958.

The thermodynamics and kinetics of crystallization and a discussion of these problems in terms of molecular and chemical structure.

2043 Thermodynamics of Hydrocarbon Mixtures. II. The Heats of Mixing of the Binary Mixtures Formed by Benzene, *cyclo*-Hexane, *n*-Heptane, Toluene, and *n*-Hexane. III. The Heats of Mixing of Ternary, Quaternary, and Quinary Mixtures Formed by Benzene, *cyclo*Hexane, Heptane, Toluene, and Hexane. A. R. Mathieson and J. C. J. Thynne. *Chemical Society, Journal*, 1956, Oct. 1956, p. 3708-3716.

2044 The Surface Chemistry of Germanium. I. Chemical Effects at *pn* Junctions. J. I. Carasso and I. Stelzer. *Chemical Society, Journal*, 1956, Oct. 1956, p. 3726-3732.

Observations suggest a mechanism correlating the electrical effects of the gas on the diode with its chemical properties.

2045 Transport to the Surface of a Rotating Disc. D. P. Gregory and A. C. Riddiford. *Chemical Society, Journal*, 1956, Oct. 1956, p. 3756-3764.

The rate of dissolution of Zn discs in aqueous I solutions as a function of temperature and of the speed of rotation of the discs, kinematic viscosity of the solution, and the coefficient of diffusion of I were measured at each temperature.

2046 Chemical Action of Ionizing Radiations in Solutions. XVI. Formation of Labile Phosphate Esters From Purine and Pyrimidine Ribonucleotides by Irradiation With X-Rays in Aqueous Solution. M. Daniels, G. Scholes, and J. Weiss. *Chemical Society, Journal*, 1956, Oct. 1956, p. 3771-3779.

2047 Steric Effects in Electronic Spectra. J. N. Murrell. *Chemical Society, Journal*, 1956, Oct. 1956, p. 3779-3791.

Spectra of the diphenyls, dimethylanilines, acetophenones, and cyanine dyes are discussed, and the nature of their electronic bands determined from the effect of *ortho*-substituents.

2048 The Effects of Substituents on the Rates of Hydrolysis of Some Organophosphorus Compounds. I. Rates in Alkaline Solution. II. Rates in Neutral Solution. D. F. Heath. *Chemical Society, Journal*, 1956, Oct. 1956, p. 3796-3809.

2049 The Rates of Reaction of Copper, Zinc, and Uranium With Organic Solvent-Dinitrogen Tetroxide Mixtures. C. C. Addison, J. C. Sheldon, and N. Hodge. *Chemical Society, Journal*, 1956, Oct. 1956, p. 3900-3911.

Activation energy of the reactions was determined. Stirring influences speed of reaction, but not its type or activation energy.

2050 A Kinetic Study of the Alkaline Hydrolysis of Some Aliphatic Esters. J. D. R. Thomas and H. B. Watson. *Chemical Society, Journal*, 1956, Oct. 1956, p. 3958-3963.

Velocities and Arrhenius activation energies were determined for the alkaline hydrolysis of the ethyl esters of ten olefinic acids in 85% alcohol.

2051* (French.) Spectral Study of the Chemiluminescence Produced During the Decomposition of Anhydrous Hydrazine. New Considerations About the Origin of the α Band of Ammonia. **Étude spectrale de la chimiluminescence produite au cours de la décomposition de l'hydrazine anhydre. Considérations nouvelles sur l'origine de la bande α de l'ammoniac.** Guy Pannetier and Henri Guenebaut. *Comptes Rendus*, v. 243, no. 17, Oct. 22, 1956, p. 1205-1207.

Oxygen was excluded when anhydrous hydrazine was decomposed. This strengthened the hypothesis that the α bands of ammonia are due to the NH_2 radical.

2052* (Russian.) Relation Between Zinc Oxide and Zinc Sulfide Catalytic Properties, and Their Luminescence. **O sviazi kataliticheskikh svoistv okisi i sernistogo tsinka s ikh liuminestsentsiei.** L. N. Shekhter, I. A. Miasnikov, and S. Ia. Pshezhetskii. *Doklady Akademii Nauk SSSR*, v. 109, no. 6, Aug. 21, 1956, p. 1163-1166.

Determination of catalytic centers and mechanism of the catalytic reaction. Effect of heat treatment.

2053* (Russian.) Electrical Conductivity and Catalytic Activity of Silver Films. **Elektricheskaia provodimost' i kataliticheskaia aktivnost' plenok serebra.** G. D. Liubarskii. *Doklady Akademii Nauk SSSR*, v. 110, no. 1, Sept.-Oct. 1956, p. 112-115.

Literary and experimental data on the relationship between the electrical conductivity of Ag film deposits on glass fiber and their catalytic activity in the oxidation of ethylene.

2054* (Russian.) Isotopic Effect in the Liquid-Vapor Equilibrium of Binary Systems Containing Deuterium Compounds. **Izotopnyĭ effekt v ravnovesii zhidkost'-par binarnykh sistem, soderzhashchikh deiterosoedineniia.** I. B. Rabinovich, P. N. Nikolaev, Z. E. Gochaliev, and N. N. Tret'iakova. *Doklady Akademii Nauk SSSR*, v. 110, no. 2, Sept. 11, 1956, p. 241-244.

Pressure diagrams of binary systems with deuterium compounds.

2055 Experimental Physical Chemistry. Farrington Daniels, Joseph Howard Mathews, John Warren Williams, Paul Bender, and Robert A. Alberty. 5th Ed. 482 p. 1956. McGraw-Hill, New York. (QD457 D22c5)

Laboratory experiments designed to illustrate the principles of physical chemistry, to train in careful experimentation, to develop familiarity with apparatus, and to encourage ability in research.

2056 Rates of Reaction of Sodium Atoms With Aromatic Halides. F. Riding, J. Scanlan, and E. Warhurst. *Faraday Society, Transactions*, v. 52, Oct. 1956, p. 1354-1362.

Reactions with a number of aromatic bromides and chlorides and pyridine halides were measured by the Polanyi diffusion-flame technique.

2057 The Absorption of Vapours of Carboxylate Esters by Thin Films of Nitrocellulose. A. L. Jones. *Faraday Society, Transactions*, v. 52, Oct. 1956, p. 1408-1413.

2058 Vibrational and Rotational Constants of Deuterated Methyl Acetylenes. M. T. Christensen and H. W. Thompson. *Faraday Society, Transactions*, v. 52, Nov. 1956, p. 1439-1450.

2059 The Correlation of Vibrational Band Intensities With Reactivity: The CN Group. H. W. Thompson and G. Steel. *Faraday Society, Transactions*, v. 52, Nov. 1956, p. 1451-1457.

Intensities of the fundamental vibration bands of the C=N group in a number of alkyl and aryl cyanides were measured in CCl_4 and in $ChCl_3$.

2060 Spectrophotometric Determination of Dissociation Constants of *p*-Hydroxy Benzoic Acid. B. N. Mattoo. *Faraday Society, Transactions*, v. 52, Nov. 1956, p. 1462-1465.

2061 Determination of the Dissociation Constants and Heats of Formation of Molecules by Flame Photometry. I. Equilibrium in Flame Gases and General Kinetic Considerations. T. M. Sugden. **II. Heat of Formation of Gaseous Cuprous Hydride. III. Stability of Gaseous Cuprous Hydroxide.** E. M. Bulewicz and T. M. Sugden. *Faraday Society, Transactions*, v. 52, Nov. 1956, p. 1465-1488.

2062 Thermodynamic Properties of the System Methane + Carbon Monoxide at 90.67°K. V. Mathot, L. A. K. Staveley, J. A. Young, and N. G. Parsonage. *Faraday Society, Transactions*, v. 52, Nov. 1956, p. 1488-1500.

2063 The Sorption and Desorption Kinetics of Water in a Regenerated Cellulose. A. C. Newns. *Faraday Society, Transactions*, v. 52, Nov. 1956, p. 1533-1545.

Evidence that the increase in free energy during sorption may be separated into the sum of an increase due to swelling the polymer against unrelaxed internal forces and an increase due to mixing with these forces fully relaxed.

2064* (German.) Foam as Dirt Carrier. **Schaum als Schmutzträger.** O. Oldenroth. *Fette, Seifen, Anstrichmittel*, v. 58, no. 9, Sept. 1956, p. 727-730.

The foam has no special significance as a dirt collector.

2065* (German.) Preparative-Analytic Studies on Solubility of Tetra- and Hexabromo-Stearic Acid in Various Solvents. **Präparativ-analytische Untersuchungen über die Löslichkeit von Tetra- und Hexabrom-stearinsäure in verschiedenen Lösungsmitteln.** Cl. Franzke and G. Ittrich. *Fette, Seifen, Anstrichmittel*, v. 58, no. 10, Oct. 1956, p. 834-838.

Recommends trichloroethylene at zero C or ligroin at 50 C for isolating the hexa-acid from a mixture. The tetra-acid requires fractional crystallization.

2066* (French.) Investigations on the Infra-Red Absorption Spectra of Ozonides. **Recherches sur les spectres d'absorption IR. des ozonides. XII.** Modified Attributions and New Attributions of the Absorption Bands of Ozonization Products; Presentation of Spectra and Remarks. **Modifications d'attributions et nouvelles attributions des bandes d'absorption des produits d'ozonation; présentation de spectres et commentaires.** E. Dallwigk and E. Briner. *Helvetica Chimica Acta*, v. 39, no. 6, 1956, p. 1826-1833.

Spectra showed that the vibration bands of the carbonyl group in some ozonization cases, are due to benzoic or anisic aldehydes. Self oxidation of aldehyde and spontaneous fission of ozonide were studied.

2067 Hydrogen Ions. Their Determination and Importance in Pure and Industrial Chemistry. Hubert T. S. Britton. v. II., 4th Rev. Ed. 489 p. 1956. Chapman & Hall, London. (QD561 B77h4)

The role of H ions in general chemistry and in numerous industrial chemical processes.

2068 On Chemical Surface Reactions in Laminar Boundary Layer Flows. Paul L. Chambré and Andreas Acrivos. *Journal of Applied Physics*, v. 27, Nov. 1956, p. 1322-1328.

The progress of an isothermal chemical reaction on a catalytic surface, which is located in a laminar hydro-dynamic flow field of large Reynolds number, is analyzed.

2069 Reactions of Methane With Iodine Activated by Radiative Neutron Capture. II. Gerrit Levey and John E. Willard. *Journal of Chemical Physics*, v. 25, Nov. 1956, p. 904-907.

Experiments clarifying the mechanism of the reaction whereby I^{128} freshly formed by the I^{127} (n, γ) I^{128} process is able to replace H in methane forming methyl iodide.

2070 Chemical Effects of Ultrasonics—"Hot Spot" Chemistry. Mary Evelyn Fitzgerald, Virginia Girffing, and James Sullivan. *Journal of Chemical Physics*, v. 25, Nov. 1956, p. 926-933.

Such chemical processes are dependent on the threshold of cavitation. Investigations on the effect of thermal conductivity and the ratio of the heat capacities of various dissolved gases and their mixtures on the yields indicates that the primary reactions are gas phase reactions, probably of a thermal nature, taking place inside the gas bubble. These reactions have been obtained only in the presence of water. Temperatures of several hundreds or thousands of degrees are reached inside the bubbles resonating in a sound field.

2071 Long-Range Intermolecular Forces. John S. Dahler and Joseph O. Hirschfelder. *Journal of Chemical Physics*, v. 25, Nov. 1956, p. 986-1005.

Calculation of forces is systematized so as to apply to molecules in electronically excited states where resonance as well as electrostatic, induction, and dispersion forces are encountered.

2072 Absorption of Spectra of I_2 and I_4 in CCl_4 Solution. R. M. Keefer and Thomas L. Allen. *Journal of Chemical Physics*, v. 25, Nov. 1956, p. 1059-1061.

Deviations from Beer's law occur in the region below 420 mμ. where the apparent extinction coefficient of the I is a linear function of its concentration. The true extinction coefficient of I_2 and the product of the formation constant and the extinction coefficient of I_4 were determined as a function of wave length.

2073 Comparison of Force Constants in Radicals and Molecules. The Halides of Zinc, Cadmium, and Mercury. William Klemperer. *Journal of Chemical Physics*, v. 25, Nov. 1956, p. 1066-1069.

Infra-red spectra of the molecules HgI_2, $CdCl_2$, $CdBr_2$, CdI_2, ZnI_2, $ZnBr_2$, and $ZnCl_2$ were observed in the region of the fundamental frequency of the antisymmetric stretching motion. As a group, the dihalides exhibit different trends in their force constants than the monohalides.

2074* (French.) An Attempt at a Theoretical Interpretation of the Solubility of Metals in Water. **Essai d'interprétation théorique de la solubilité des métaux dans l'eau.** Jean-Charles Pariaud and Pierre Archinard. *Journal de Chimie Physique*, v. 53, no. 9, Sept. 1956, p. 765-769.

Study of a limit of solubility and of its causes. Application of the Nernst equation for various metals.

2075 An Estimate of the Contribution of Induced Dipoles to the Orientational Polarization of Adsorbates. G. C. Benson, E. W. Channen, and R. McIntosh. *Journal of Colloid Science*, v. 11, Aug.-Oct. 1956, p. 593-607.

2076 Interrelationships in the Solvent Extraction Behaviour of Scandium, Thorium, and Zirconium in Certain Tributyl Phosphate-Mineral Acid Systems. D. F. Peppard, G. W. Mason, and J. L. Maier. *Journal of Inorganic and Nuclear Chemistry*, v. 3, Oct. 1956, p. 215-228.

2077* (Russian.) Study of the Thermal and Chemical Activations of Talc-Like Catalysts Obtained From the Synthesis of CO and H_2. **Izuchenie termicheskoi i khimicheskoi aktivatsii tal'kovykh katalizatorov sinteza iz Co i H_2.** A. N. Bashkirov and F. I. Novak. *Khimiia i Tekhnologiia Topliva*, 1956, no. 10, Oct. 1956, p. 32-36.

The use of talc catalysts in the synthesis of CO and H. Talc should be calcined at about 600 C. The catalysts should be activated by compounds containing alkali metal ions.

2078* (English.) **Distinct Maximum Appearing in the Viscosity Curve of Dilute Polyelectrolyte Solutions.** Hiroshi Inagaki, Hisaya Sakurai, and Toshio Sasaki. *Kyoto University, Institute for Chemical Research, Bulletin*, v. 34, Mar. 1956, p. 74-86.

Viscosity measurements for the system of sodium carboxymethyl cellulose and several simple electrolytes, such as NaCl, NaOH, Na_2CO_3, and $MgCl_2$. A procedure for fitting numerically the viscosity curve at any extraneous electrolyte content.

2079 Magnetochemistry. Pierce W. Selwood. 2nd Rev. Ed. 435 p. 1956. Interscience Publishers, New York. (QD591 Se49m2)

Classical determination of average susceptibility; measurement of principal susceptibilities; specific magnetization and thermomagnetic analysis; resonance methods; atomic diamagnetism; molecular paramagnetism; antiferromagnetism.

2080 Quarterly Periodic Status Report of the Hydrogen Peroxide Laboratories. R. L. Wentworth. *Massachusetts Institute of Technology, Quarterly Periodic Status Report for Office of Naval Research Contract No.* 1841, (11), Sept. 1956, 9 p. (QD181.H1 M38.3q Contin.)

Reports work on stability of H_2O_2, flame velocities in H_2O_2 vapor, supercooling of liquid H_2O_2, and high pressure ignition limits of the vapor.

2081 The Mathematics of Diffusion. J. Crank. 347 p. 1956. Oxford University Press, London. (QD543 C85m)

Definition and measurement of diffusion coefficients, diffusion with a moving boundary, simultaneous diffusion and chemical reaction, and the diffusion of heat and moisture.

2082 Molecular Interactions in Carbon Monoxide and Nitrogen. J. M. Lupton. 95 p. Van Gorcum & Comp., Amsterdam. (QD501 L97m)

A fundamental study of similarity of the N and CO molecules.

2083 Molecular Structure and Related Problems. Y. Asami and K. Higasi, editors. 139 p. 1954. Research Institute of Applied Electricity, Sapporo, Japan. (QC173 H68m)

Nine papers deal with molecular structure of aromatic and conjugated molecules in which so-called π-electrons play an important role, conduction of electricity through solid alcohols, paramagnetic resonance, intermolecular potential, and ultrasonic waves.

2084 A Review of the Reaction Kinetics of Deuterium and Tritium Compounds. VI. Solvolysis Reactions. Lawrence M. Brown. *National Bureau of Standards (U. S. Atomic Energy Commission)*, NBS-4712, July 1956, 18 p. (UF767 Un3.1nb Contin.)

2085 A Solution of the Diffusion Equation for Isotopic Exchange Between a Semi-Infinite Solid and a Well Stirred Solution. I. R. Beattie and D. R. Davies. *Philosophical Magazine*, v. 1, ser. 8, no. 9, Sept. 1956, p. 874-879.

2086* The Mechanism of Chemisorption on Metals. Gert Ehrlich. *Physics and Chemistry of Solids*, v. 1, Sept.-Oct. 1956, p. 3-13.

With the possible exception of H, molecules physically adsorbed on the surface form a reservoir from which chemisorption can occur. Related kinetic mechanisms are developed, both for reaction on a uniform surface and for reaction at surface singularities, such as grain boundaries or lattice steps.

2087* (English.) **The Solubilities of Compressed Acetylene Gas in Liquids. IV. The Solubility of Compressed Acetylene Gas in Tetrahydrofuran.** Ryo Kiyama and Hiroyuki Hiraoka. *Review of Physical Chemistry of Japan*, v. 26, no. 1, 1956, p. 1-8.

2088* (French.) Kinetics of Applied Chemistry. **Cinétique chimique appliquée. XIV.** Chain Reactions. **Les réactions en chaines.** J. C. Jungers, G. E. Limido, and J. C. Balacéanu. *Revue de l'Institut Francais du Pétrole et Annales des Combustibles Liquides*, v. 11, no. 8, Sept. 1956, p. 1019-1074.

A study of kinetic chemistry in the field of plastics and an interpretation of speed and kinetics; in polycondensation and polymerization.

2089 The Cobalt-Salt-Catalyzed Autoxidation of Benzaldehyde. C. E. H. Bawn and J. E. Jolley. *Royal Society, Proceedings*, v. 237, ser. A, Nov. 6, 1956, p. 297-312.

2090 The Photochemical Decomposition of Dicumyl Peroxide and Cumene Hydroperoxide in Solution. R. G. W. Norrish and M. H. Searby. *Royal Society, Proceedings*, v. 237, ser. A, Nov. 20, 1956, p. 464-475.

Reactions in *n*-hexane and in CCl_4.

2091* (English.) **Some Aspects of the Connection Between the Structure and the Activities of the Components in Molten Salt Mixtures.** Håkon Flood. *Svensk Kemisk Tidskrift*, v. 68, no. 10, 1956, p. 509-520.

Formulas expressing activity; application to the activity of ferrous oxide in open hearth slags and to liquidus curves in alkali halide phase diagrams; complex formation in salt melts.

2092 Thermodynamic Functions of Gases. v. I. Ammonia, Carbon Dioxide and Carbon Monoxide. v. II. Air, Acetylene, Ethylene, Propane and Argon. F. Din, editor. 175 and 201 p. 1956. Butterworths Scientific Publications, London. (QC286 D61t)

2093* (German.) Chelatometry. **Chelatometrie. IX.** Calculation of Apparent Stability Constants of Complexes. A Contribution to the Jacimirskyi Theory. **Die Berechnung scheinbarer Stabilitätskonstanten von Komplexonaten. Ein Beitrag zur Jacimirskij-Theorie. X.** Eriochrome Red B, a New *pm*-Indicator. **Eriochromrot B, ein neuer *pm*-Indicator.** Peter Wehber. *Zeitschrift für Analytische Chemie*, v. 153, no. 4, 1956, p. 249-261.

Calculation of the apparent stability constants of simple 1-1-metalchelates; advantages of using eriochrome red as a *pm*-indicator and of various applications to metals and pyrazolone dyes.

2094* (German.) System Bismuth Sulfide-Copper Sulfide, and Ternary System Bi-Bi_2S_3-Cu_2S-Cu. **Über das System Wismulsulfid-Kupfersulfid und über das Dreistoffsystem Bi-Bi_2S_3-Cu_2S-Cu.** Rudolf Vogel. *Zeitschrift für Metallkunde*, v. 47, no. 10, Oct. 1956, p. 694-699.

The phase diagram of the systems Bi_2S_3-Cu_2S and Bi-Bi_2S_3-Cu_2S-Cu are derived from X-ray, thermal, and microscopic investigations.

2095* (German.) New Method of Solubility Determination of Solids by Means of Radioactive Indicators. **Eine neue Methode zur Bestimmung der Löslichkeit eines Festkörpers mit Hilfe eines Radioindikators.** P. Jordan. *Zeitschrift für Physikalische Chemie (Frankfurt)*, v. 9, nos. 3-4, Nov. 1956, p. 187-215.

Determination of solubility of a solid in a liquid as a function of temperature.

2096* (German.) Equilibrium of Titanium Nitride Formation and the Titanium Tetrachloride Entropy. **Über das Gleichgewicht der Titannitrid-Bildung und die Entropie des Titantetrachlorids.** A. Münster, G. Rinck, and W. Ruppert. *Zeitschrift für Physikalische Chemie (Frankfurt)*, v. 9, nos. 3-4, Nov. 1956, p. 228-238.

2097* (English.) **Activation Process of Charcoal by Gas.** Kenzi Tamaru. *Zeitschrift für Physikalische Chemie (Frankfurt)*, v. 9, nos. 3-4, Nov. 1956, p. 239-244.

Studies by wet oxidation method suggest that the impregnated active carbon has a different structure from that of a gas-activated carbon.

See also: **1812** (refraction and transmission of Si modifications); **1999** (thermal stability of urea complexes); **3175** (unipolarly charged aerosols).

COATINGS

2098 An Application of the Colormaster Differential Colorimeter for the Control and Testing of Maintenance Paints. H. A. Tuttle and M. M. Gerson. *American Paint Journal (Convention Daily)*, v. 41, Nov. 13, 1956, p. 35-38, 42.

2099 Determination of Urea-Formaldehyde Resins in Coatings via Urea Analysis. M. H. Swann and G. G. Esposito. *Analytical Chemistry*, v. 28, Dec. 1956, p. 1984.

Release of ammonia from resins on treatment with alkali provides a rapid quantitative means of analyzing coatings for urea resin.

2100 Calorizing of Gas-Turbine Blades of Austenitic Steel. V. I. Prosvirin, A. I. Fedosov, and Yu. S. Myakishev. *Henry Brutcher Translation No.* 3805, 8 p. (From *Metallovedenie i Obrabotka Metallov*, v. 2, no. 4, Apr. 1956, p. 50-56.) Henry Brutcher, Altadena, Calif.

Previously abstracted from original. See item 10665, v. 5, Sept. 1956.

2101* (German.) Corrosion Protection With Paint. **Korrosionsschutz durch Anstrich.** Walter Toeldte. *Chemiker-Zeitung*, v. 80, no. 20, Oct. 20, 1956, p. 708-711.

Selection and preparation of paint. The effect of protective painting and a test method.

2102 Properties, Specifications, Tests and Recommendations for Coal Tar Coatings. II. Cold Applied Coatings. W. F. Fair, Jr. *Corrosion*, v. 12, Dec. 1956, p. 605-610.

Surface preparation, types and characteristics of coatings; selection of primer; water vapor permeability; recommendations for protection in the more corrosive atmospheres.

2103 The Use of Hot-Dip Strippable Coatings for the Protection of Spares. F. A. S. Wood and N. R. Kirkby. *Corrosion Technology*, v. 3, Nov. 1956, p. 355-356.

Easily applied coatings of tough, rubbery plastic give complete protection against corrosion and abrasion.

2104* (German.) The Behavior of Pentaerythritol in Manufacture of Oil-Modified Alkyd-Resins. **Über das Verhalten von pentaerythrit bei der Verarbeitung auf ölmodifizierte Alkydharze.** H. Müller. *Fette, Seifen, Anstrichmittel*, v. 58, no. 10, Oct. 1956, p. 839-844.

Influence of ash-contents of various pentaerythritol qualities and of catalysts on the processing-speed and on the brightness of the colors produced.

2105 Catalyst Spraying Applied to Painting Jet Airplanes. D. M. Golding. *Industrial Finishing*, v. 33, Nov. 1956, p. 28 + 6 pages.

New multi-step finishing process provides surface finish which is impervious to jet exhausted diester oil vapors.

2106* Vacuum Metallised Coatings. *Industrial Finishing (London)*, v. 9, Oct. 1956, p. 150 + 4 pages.

Survey of the use of this process as a preliminary to electroplating on non-conductors, and as a speedy and cheaper method of producing a permanent surface coating.

2107 Plating of Tungsten by an Oxidation-Reduction Cycle. M. G. Charlton and G. L. Davis. *Institute of Metal Finishing Bulletin*, v. 6, Autumn 1956, p. 28-39.

Tungsten is deposited by holding a W source at high temperature in an atmosphere of H and water vapor with the body to be plated close to the W and heated to above 700 C.

2108 Applications of Infra-Red Spectroscopy to Surface Coatings. L. A. O'Neill and C. P. Cole. *Journal of Applied Chemistry*, v. 6, Sept. 1956, p. 399-407.

A survey of some applications of the technique in fundamental research on the chemistry of drying oils, fatty acids and resins, and changes during their processing or drying in thin films.

2109 Method for Measurement of the Rate of Drying of Surface Coatings. James R. Jenness, Jr. *Journal of Applied Physics*, v. 27, Nov. 1956, p. 1371-1373.

By observation of rolling friction effects, the rate of drying of paints, varnishes, and other surface coatings can be evaluated more precisely than by previous methods. The time of descent of a ball rolling down a coated incline is proposed as an index of surface condition.

2110 Flexibility of Zinc Coatings. H. Bablik, F. Goetzl, and E. Nell. *Metal Industry*, v. 89, Nov. 2, 1956, p. 373-375.

Zinc of 99.99% purity in cast state will withstand a maximum elongation of 0.5% without rupture, electrolytic Zn about 1.0%. Sendzimir-type sheets show microscopic injury after double bends.

2111* (German.) Protection of Metal Surfaces by Coatings. **Über den Schutz von Metalloberflächen durch Anstrichstoffe.** R. Endres. *Metalloberfläche*, v. 10, no. 11, Nov. 1956, p. 321-326.

The need for anticorrosive coating of iron and steel structures. Physically- and chemically-drying paints, their properties and effects. Preparation of the metal surface before coating. Painting methods.

2112* (German.) Making and Testing Silvered Copper Wires. **Versilberte Kupferdrähte, ihre Herstellung und Prüfung.** A. Keil. *Metalloberfläche*, v. 10, no. 11, Nov. 1956, p. 327-329.

Advantages and disadvantages of dip coating and other methods. Adherence and other coating properties.

2113 Finishes for Aluminum Alloys. II. Chemical or Conversion Coatings. Walter E. Pocock. *Metal Progress*, v. 70, Nov. 1956, p. 97-101.

Coatings formed by chemical reaction of Al with chromate solutions provide excellent resistance to corrosion and good bases for paint. They are inexpensive to produce and have replaced anodic coatings in many applications.

2114 Comparison of Finishes for Aluminum. Walter E. Pocock. *Metal Progress*, v. 70, Nov. 1956, p. 96B.

Data sheet comparing electrolytic and chemical conversion processes with regard to properties of coating, treatment, and equipment.

2115 Gamma Radiation Damage Studies of Organic Protective Coatings and Gaskets. J. C. Bresee, C. D. Watson, and J. S. Watson. *Oak Ridge National Laboratory (U. S. Atomic Energy Commission)*, ORNL-2174, Nov. 1956, 30 p. (UF767 U3o Contin.)

Qualitative results of screening studies; quantitative results of decontamination tests and physical property measurements.

2116* Studies in Fire-Retardant Paints. III. Chlorinated Alkyd Paint Systems. *Official Digest, Federation of Paint and Varnish Production Clubs*, v. 28, Nov. 1956, p. 942-953.

The higher the antimony oxide/organic chloride ratio, the better the fire retardant properties. Best paint contained antimony oxide/barium sulfate: 1/1 in a chlorinated alkyd vehicle.

2117* Deterioration of Protective Coatings Due to Molds and Bacteria. Bibliographic Study. *Official Digest, Federation of Paint and Varnish Production Clubs*, v. 28, Nov. 1956, p. 954-984.

An abstracted, cross-referenced bibliography reviewing the literature since 1947. Discussion includes recommendations for compiling a technical library on the subject, methods for recognizing microorganism attack, and performance of currently popular preservatives.

2118* The Search for an Incompatibility Test. *Official Digest, Federation of Paint and Varnish Production Clubs*, v. 28, Nov. 1956, p. 985-1000.

Compatabilities of chlorinated rubber-alkyd and alkyd-alkyd systems were evaluated by solution transmittance, film transmittance, densitometry, viewing with direct and scattered light, and by low magnification photomicroscopy.

2119* Exposure Characteristics of Clear Finishes for Exterior Wood Surfaces. *Official Digest, Federation of Paint and Varnish Production Clubs*, v. 28, Nov. 1956, p. 1001-1020.

The alkyd resins as a class, and the long oil penta type and isophthalic types in particular, show most promise for improved performance.

2120* Factors Affecting Freeze-Thaw Stability Tests of Latex Paints. *Official Digest, Federation of Paint and Varnish Production Clubs*, v. 28, Nov. 1956, p. 1021-1036.

Effects of package size, temperature, and rate of freeze.

2121* A Method of Determining Brushability by Instrumentation. *Official Digest, Federation of Paint and Varnish Production Clubs*, v. 28, Nov. 1956, p. 1037-1059.

The Hi-Shear Viscometer is an easy to operate, inexpensive instrument suitable for evaluating ease of brushing.

2122* Comparative Evaporation Rates of Paint Solvents. II. *Official Digest, Federation of Paint and Varnish Production Clubs*, v. 28, Nov. 1956, p. 1060-1077.

Procedure for determining rate of evaporation of volatile liquids is limited only by the viscosity of the liquid which must be sufficiently low to permit the dispensing of an accurately measured sample from a syringe.

2123* An Evaluation of Anti-Skinning Agents in Clear Vehicles. *Official Digest, Federation of Paint and Varnish Production Clubs*, v. 28, Nov. 1956, p. 1083-1088.

Eight different types of anti-skinning agents were tested in four different vehicles for effectiveness in retarding skin formation. Effect on viscosity, color, odor, and drying time was noted.

2124* Blackening Effect of Hydrogen Sulphide on Exterior White House Paints. *Official Digest, Federation of Paint and Varnish Production Clubs*, v. 28, Nov. 1956, p. 1089-1100.

Blackening can be avoided only by eliminating all Pb. Other factors are stated.

2125 The History, Manufacture and Uses of Lithopone. J. G. Rigg. *Oil & Colour Chemists' Association, Journal*, v. 39, Nov. 1956, p. 809-831.

Development of emulsion paints with high sheen; possible effects of particle size range on gloss and emulsion stability; advantages of additions of mica and zinc oxide.

2126 A Wide-Range Thin-Film Recording Viscometer. C. C. Mell. *Oil & Colour Chemists' Association, Journal*, v. 39, Nov. 1956, p. 832-844.

Recording plate-and-cone viscometer automatically plots rate of shear against shearing stress at two shearing-rate ranges.

2127 Unsaturated Polyester Resins in Surface Coatings. L. W. J. Damen. *Paint Manufacture*, v. 26, Nov. 1956, p. 407-410.

Formulation of coatings; difficulties from the limited pot-life of the prepared finish.

2128 Testing Paints by Outdoor Exposure. II. Assessment of Film Deterioration. C. R. Edwards and E. Jenkins. *Paint Manufacture*, v. 26, Nov. 1956, p. 411-416.

Recording results; examination of panels; standards of assessment.

2129 Formulating Industrial Finishes. II. Melamine Resins. C. H. Morris. *Paint Manufacture*, v. 26, Nov. 1956, p. 422-425.

2130* Thin Film Evaporometer. J. P. McGuigan. *Paint and Varnish Production*, v. 46, Nov. 1956, p. 31-35.

Device permits rapid accurate determination of evaporation characteristics of lacquer thinner mixtures and solvents with which they are formulated.

2131* Surface Availability of Inhibitors in Protective Coating Systems. I. Dichromate Treatment of Magnesium Surfaces. Max Kronstein and Joseph C. Pettorino. *Paint and Varnish Production*, v. 46, Nov. 1956, p. 36-41.

Immersion of Mg panels into an NH_4F pickle and then into a $Na_2Cr_2O_7$ -NaF solution produces a Cr based inorganic coating which has an inhibiting effect on corrosion.

2132* Spread Coating Techniques. I. Dale G. Higgins. *Plastics Technology*, v. 2, Nov. 1956, p. 741-746.

Describes use of knife, roller, impregnation, transfer, and lamination techniques.

2133* (French.) The Kanigen Nickel Plating Process. **Le nickelage chimique kanigen.** Grégoire Gutzeit. *Revue de l'Aluminium*, v. 33, no. 235, Sept. 1956, p. 804-809.

Processes give interesting results on Al, providing very hard and protective coatings on pieces of any shape.

2134* (German.) Structure of Metal Spraying Layers. **Aufbau von Metall-Spritzschichten.** A. Matting and W. Raabe. *Schweissen und Schneiden*, v. 8, no. 10, Oct. 1956, p. 369-374.

Optical, photographic, and caloric determination of temperature at spraying jet; deformation and coherence in sprayed layers.

2135* (Dutch.) The Hard Surfacing of Wear Resistant Metal Surfaces. **Het oplassen van slijtvaste lagen.** P. G. Weeber, J. W. Mey, and Th. Berkhout. *Smit Mededelingen*, v. 11, no. 3, July-Sept. 1956, p. 69-77.

Preferred type of hard surfacing metal, method of application, and the measurement of wear resistance.

2136 Non-Flammable Paint Strippers. III. Activators, Thickeners, Evaporation Retarders. Bernard Berkeley, Daniel Schoenholz, and Michael Skrypa. *Soap and Chemical Specialties*, v. 32, Nov. 1956, p. 149, 151, 153.

Performance of activators depends largely on the binary solvent mixture and the type of organic coating to be removed. Most useful thickening agents are ethyl cellulose, cellulose acetate, and methyl cellulose.

2137 Vacuum Deposition of Thin Films. L. Holland. 541 p. 1956. John Wiley & Sons, New York. (TS695 H71v)

Plant design, film production, and physical properties of thin films.

2138* (German.) Cold Galvanizing With Zinc Dust-Pastes. **Kaltverzinken mit zinkstaub-Pasten.** K. Zimmermann. *VDI Zeitschrift*, v. 98, no. 30, Oct. 1956, p. 1727-1728.

Protection against corrosion by coating with this commercial zinc-paste (94% zinc-dust). Economics.

See also: **2600** (acid-proof coatings); **2666** (coatings for Al); **2964** (structure of vapor-deposited coatings).

CONTROL SYSTEMS, COMPUTERS, AND SYSTEMS ENGINEERING

2139* Automatic Controls in Filter Plants. Milford E. Rogers. *American Water Works Association, Journal*, v. 48, Nov. 1956, p. 1438-1444.

2140* Envelope Transfer Function Analysis in A-C Servo Systems. M. Panzer. *Applications and Industry*, 1956, no. 27, Nov. 1956, p. 274-279.

Through the use of accurate approximations the transfer function of type-1 elements in cascade may be found as the product of individual transfer functions.

2141* Analogue Computer Methods Applied to Steady-State A-C System Problems. H. A. Kahle and H. M. McConnell. *Applications and Industry*, 1956, no. 27, Nov. 1956, p. 279-282.

2142* A Phase-Space Method for the Synthesis of Nonlinear Servomechanisms. Richard E. Kuba and Louis F. Kazda. *Applications and Industry*, 1956, no. 27, Nov. 1956, p. 282-290.

The phase trajectory of the optimum contactor servo is used as a guide in determining the limiting position of the approximating trajectory for the nonlinear system.

2143* An Experimental Treatment of Nonlinear Servomechanisms. R. S. Neiswander. *Applications and Industry*, 1956, no. 27, Nov. 1956, p. 308-316.

An experimental method of achieving appropriate first switching points for certain nonlinear single-loop servomechanisms.

2144* Missing Values in Experiments Analysed on Automatic Computers. Michael Healy and Michael Westmacott. *Applied Statistics*, v. 5, Nov. 1956, p. 203-206.

Technique for dealing with missing observations is applicable to any analysis in which least-squares estimates are derived.

2145* Integrating Servos in the Master System. Robert J. Bibbero. *Automatic Control*, v. 5, Nov. 1956, p. 16-19.

Although specifically dealing with missile control systems, the functional techniques are common to precision system operations. (To be continued.)

2146* Use Meter-Relays to Monitor and Control. Paul Saint-Amour. *Automation*, v. 3, Dec. 1956, p. 74-78.

Operation of relays; accuracy and response time; typical applications; new developments.

2147* (Russian.) Application of *D*-Decomposition for Root Loci Plotting and for Analysis of Automatic Control Systems Quality. **Primenenie operatsii *d*-razbieniia dlia postroeniia kornevykh kharakteristiki issledovaniia kachestva sistem avtomaticheskogo regulirovaniia.** Iu. A. Gopp. *Avtomatika i Telemekhanika*, v. 17, no. 9, Sept. 1956, p. 789-798.

2148* (Russian.) Calculation and Analysis of Dynamics of Throttle Hydroamplifiers. **Raschet i analiz dinamiki drossel'nykh gidrousilitelei.** V. A. Khokhlov. *Avtomatika i Telemekhanika*, v. 17, no. 10, Oct. 1956, p. 871-879.

2149* (Russian.) On the Problem of Approximate Solution of Differential Equations in Terms of Partial Derivatives by Means of Analog Computers. **K voprosu o priblizhennom reshenii differentsial'nykh uravnenii v chastnykh proizvodnykh pri pomoshchi elektricheskikh modelei.** E. S. Kozlov and N. S. Nikolaev. *Avtomatika i Telemekhanika*, v. 17, no. 10, Oct. 1956, p. 890-896.

An analog computer for solving the equations and a description of its units.

2150* (Dutch.) Accessories Used in Making Frequency Divisions. **Hulpmiddelen bij het maken van frequentieverdelingen.** A. Bakker. *Bedrijf en Techniek*, v. 11, no. 264; *Electronica section*, v. 9, no. 211, Oct. 20, 1956, p. 161-163.

The apparatus used for the production of frequency divisions in a textile laboratory, in relation to time saving automation.

2151 (German.) Brief Handbook on Automatic Control Engineering. **Kleines Handbuch technischer Regelvorgänge.** Winfried Oppelt. 447 p. 1954. Verlag Chemie, Weinheim, Germany. (TJ213 Op5k)

Introduction to automation; design and construction of devices. Mathematical treatment of control systems. The control circuit and feedback systems.

2152* The Dekatron in a Digital Data Transmission System. G. Shand and C. Dean. *British Institution of Radio Engineers, Journal*, v. 16, Oct. 1956, p. 533-542.

These tubes enable the functioning of the timing system to be monitored so that faults may be quickly and easily located by visual observations of the behavior of the glow discharges.

2153 The Btu Computer—An Advanced Data System for Industry. Fred W. Hannula. *Canadian Chemical Processing*, v. 40, Nov. 1956, p. 89-91, 94, 96.

System is illustrated by application to measurement of rate at which cooling fluid of heat exchanger gains heat.

2154* Use of Automatic Programming. Walter F. Bauer. *Computers and Automation*, v. 5, Nov. 1956, p. 6-11, 36-37.

Motivations and history; composition of automatic programming; present and future systems.

2155 Controlling Register Automatically. Joseph C. Frommer. *Control Engineering*, v. 3, Dec. 1956, p. 88-93.

A multi-color printing press is used as a typical process to show how the vagaries of the printing press determine which of the many available control modes will satisfy product quality specifications.

2156 Controlling a Process. John M. Salzer. *Control Engineering*, v. 3, Dec. 1956, p. 95-99.

How the computer communicates with the system; controlling with an absolute computer, an incremental computer, and a pulse-rate computer.

2157* Precision Control of Shaft Speed. W. H. P. Leslie. *Electrical Energy*, v. 1, Sept. 1956, p. 2-5.

An electromechanical speed control used for precision dynamometers; a mechanical differential indicates the error between actual and desired speed. A new electronic digital system.

2158* The Solution of Electric Field Problems Using a Digital Computer. J. H. Wensley and F. W. Parker. *Electrical Energy*, v. 1, Sept. 1956, p. 12-16.

Program for a digital computer enabling the electric potential to be found within a structure possessing axial symmetry, and within which materials having different dielectric constants exist.

2159 How to Design an Amplifier-Less Synchro System. Basil Jacks. *Electrical Manufacturing*, v. 58, Dec. 1956, p. 74-78.

Design economy has brought about a loop that is without servo-amplifier, servo-motor, or damping generator.

2160 Digital Printout Techniques for Automatic Proportioning Control. *Electrical Manufacturing*, v. 58, Dec. 1956, p. 85-91, 290, 292.

Automatic weight and automatic data logging for proportioning grain and feed formulas.

2161 Digital Codes for Numerical Control. W. H. T. Holden. *Electrical Manufacturing*, v. 58, Dec. 1956, p. 105-111.

Surveys coding systems applicable to numerically programmed machine tools, computers, supervisory control, or digital-readout data-logging equipment.

2162 Number Systems for Computers. Irving J. Gabelman. *Electronic Industries & Tele-Tech*, v. 15, Dec. 1956, p. 32 + 7 pages.

Advantages of the popular systems. Associated arithmetic operations.

2163 Locating "Open Heaters" in Computer Circuitry. Ronald L. Ives. *Electronic Industries & Tele-Tech*, v. 15, Dec. 1956, p. 46-47, 102.

Circuitry for high speed inspection of tube filaments.

2164 Document Processor Reads Coded Dots. Raymond L. Fortune. *Electronics*, v. 29, Dec. 1956, p. 164-168.

Coded information, in the form of dots printed on source documents, is converted into pulse-signal output for operation of computers, card-punchers, and other data-handling equipment. Printed code on business forms is sensed and translated at speed of 500 forms per min.

2165* (German.) Electrical Memory for Figures. **Elektrische Gedächtnisse für Ziffern.** Karl Steinbuch. *ETZ, Elektrotechnische Zeitschrift*, v. 77, Ausgabe A, no. 21, Nov. 1956, p. 799-806.

Principles, information capacity, and prospective developments in electrical computers.

2166 The Application of Matrix Methods to Multi-Variable Control Systems. R. J. Kavanagh. *Franklin Institute, Journal*, v. 262, Nov. 1956, p. 349-367.

Practical examples of the analysis and synthesis of systems; criteria for the realizability of control systems with desired characteristics.

2167* Convention on Digital-Computer Techniques. Introductory Lecture. F. C. Williams. *Institution of Electrical Engineers, Proceedings*, v. 103, pt. B, Suppl., no. 1, Apr. 1956, p. 3-9.

Development of machines and techniques in the past decade; design, control, and cost considerations; advantages and uses.

2168* Digital Computers and the Load-Flow Problem. J. M. Bennett. *Institution of Electrical Engineers, Proceedings*, v. 103, pt. B, Suppl., no. 1, Apr. 1956, p. 16-25.

The technique evolved in dealing with the load-flow problem on one particular computer, with special reference to programming devices.

2169* Power-System Engineering Problems With Reference to the Use of Digital Computers. C. Robinson and D. H. Tompsett. *Institution of Electrical Engineers, Proceedings*, v. 103, pt. B, Suppl., no. 1, Apr. 1956, p. 26-34.

Mathematical and practical considerations involved in economic load dispatching, load curve analysis, and 3-phase circuit calculations.

2170* The Use of Digital Computers in Obtaining Solutions to Electric-Circuit Problems Involving Switching Operations. S. J. M. Denison and D. G. Taylor. *Institution of Electrical Engineers, Proceedings*, v. 103, pt. B, Suppl., no. 1, Apr. 1956, p. 35-46.

2171* Transformer Design With Digital Computers. J. V. Oldfield, D. McDonald, and M. W. Humphrey Davies. *Institution of Electrical Engineers, Proceedings*, v. 103, pt. B, Suppl., no. 1, Apr. 1956, p. 54-58.

Use of digital computers in transformer design should lead to better and more exact designs and enable design staff to devote more attention to the many fundamental problems which remain unsolved.

2172* The Application of Digital Computers to Electric Traction Problems. A. Gilmour. *Institution of Electrical Engineers, Proceedings*, v. 103, pt. B, Suppl., no. 1, Apr. 1956, p. 59-67.

A program prepared for a high-speed digital computer for calculating speed/time curves, energy consumption, and motor heating for a train with given characteristics travelling on a given route.

2173* Use of Interpretation Routines on a General-Purpose Digital Computer for the Design of Linear and Non-Linear Control Systems. W. D. Worthy. *Institution of Electrical Engineers, Proceedings*, v. 103, pt. B, Suppl., no. 1, Apr. 1956, p. 68-76.

2174* A Decimal Addition-Subtraction Unit. M. W. Allen. *Institution of Electrical Engineers, Proceedings*, v. 103, pt. B, Suppl., no. 1, Apr. 1956, p. 138-145.

Design of a coded decimal addition-subtraction unit for use in a digital differential analyzer. Circuits employ junction-transistor flip-flops driving diode gating circuits.

2175 Digital Automation. XIII. Digital Controllers. Martin Klein, Frank K. Williams, and Harry C. Morgan. *Instruments and Automation*, v. 29, Nov. 1956, p. 2205-2207.

Digital techniques can be applied directly to servo-type closed loop control situations. Fluid ratio control is particularly adaptable. Digital valve-positioning technique permits control valve to be used directly in digital automation system.

2176* Operational Design of Gas Flow Control Systems. G. V. Schwent, W. K. McGregor, and D. W. Russell. *ISA Journal*, v. 3, Nov. 1956, p. 454-458.

Requirements of each component and of the entire system; example specification.

2177 A Comprehensive Design Manual on Static Electrical Controls. John C. Ponstingl. *Machine Design*, v. 28, Nov. 29, 1956, p. 89-104.

Functions; components, characteristics, and applications. Operation of static control logic functions.

2178 Hydraulic Servo Components. I. Their Effect on System Performance. J. M. Nightingale. *Machine Design*, v. 28, Nov. 29, 1956, p. 114-118.

How input elements, error detectors, valve amplifiers, and power supplies affect performance of servo systems.

2179* (German.) Transductor Technique. **Transduktortechnik. III.** Characteristic Control Line and Magnetic Characteristic Line. **Steuerkennlinie und magnetische Kennlinie.** W. Schilling. *Regelungstechnik*, v. 4, no. 10, 1956, p. 255-261.

Establishes the relationship between the characteristic control line of the transductor and the characteristic magnetizing line of the employed iron core.

2180* Root Locus Method for System Analysis. Robert D. Catenaro. *Sperry Engineering Review*, v. 9, Sept.-Oct. 1956, p. 10-13.

Capabilities; comparison with other methods. Typical servo system is subjected to analysis by this method.

2181* (Russian.) Automatizing the Operation of the Tube Rolling Mill. **Avtomatizatsiia raboty truboprokatnykh stanov.** E. Katsnelson. *Stal'*, v. 16, no. 11, Nov. 1956, p. 1000-1005.

Characteristics of some existing Soviet equipment and methods for adapting it to automation. Various types of switches, probes, and pick-ups.

2182 Some Basic Aspects of Numerical Machine Tool Control. L. W. Herchenroeder. *Steel Processing*, v. 42, Nov. 1956, p. 625-628.

2183* Applications of Automatic Assembly. Ralph H. Eshelman and T. W. Black. *Tool Engineer*, v. 37, Dec. 1956, p. 111-120.

Tool engineering problems associated with automatic assembly can be reduced, in many cases, to combining commercially available machine components into an integrated machine capable of performing one or more assembly operations at the desired production rate.

See also: **1759** (use of electronic computer in fertilizer formulation); **1865** (automatic control of water treatment plants); **2201** (automatic manufacture of electrical connections); **2207** (computations in electrical design); **2243** (response of servomechanisms); **2423** (automatic controls for boilers); **2426** (automatic sorter); **3271** (linear prediction-filter theory).

ELECTRICAL ENGINEERING

2184* Applying Industrial Controllers for Safe Operation. G. W. Heumann. *Applications and Industry*, 1956, no. 27, Nov. 1956, p. 291-295.

Enclosures for industrial use; adequate interrupting capacity controllers.

2185* (Russian.) On a Method of Time-Pulse Transformation. **Ob odnom metode vremia-impul'snogo preobrazovaniia.** I. A. Zakhariia and V. N. Mikhailovskii. *Avtomatika i Telemekhanika*, v. 17, no. 9, Sept. 1956, p. 836-846.

Analysis of a new method of transformation of square-topped pulse voltages into proportional spaces of time between leading edges of two pulses filled with H.F. fluctuations.

2186 Silicon Carbide Varistors. Properties and Construction. H. F. Dienel. *Bell Laboratories Record*, v. 34, Nov. 1956, p. 407-411.

Principles, properties, manufacture, and uses.

2187* Switching High-Voltage Capacitors With Airblast Circuit-Breakers. P. Baltensperger. *Brown Boveri Review*, v. 43, no. 8, Aug. 1956, p. 287-295.

2188* The Electric CoCo Locomotives, Series Ae 6/6, for the Swiss Federal Railways. E. Hugentobler. *Brown Boveri Review*, v. 43, no. 8, Aug. 1956, p. 301-316.

Development of electric traction on Swiss line. Mechanical details of locomotive; electrical equipment.

2189* Diesel-Electric Traction in France. R. Boisson. *Brown Boveri Review*, v. 43, no. 8, Aug. 1956, p. 318-332.

Details on various types of diesel-electric vehicles.

2190* Classified Bibliography on Insulated Conductors Beginning With 1930. Sections individually paged. 1954. Committee on Insulated Conductors, American Institute of Electrical Engineers, New York. (ZTK3301 Am35.4c)

Bibliography is classified by publication and subject for 20 classes of publications and 12 main subjects.

2191 Communication Engineering. W. L. Everitt and G. E. Anner. 3rd Ed. 644 p. 1956. McGraw-Hill, New York. (TK3221 Ev27c3)

Fundamentals of linear-network analysis and synthesis, including the use of unilateral elements. Analysis of types of modulation and the transformation of transients from the time to the frequency domain.

2192 Currents, Fields, and Particles. Francis Bitter. 599 p. 1956. Technology Press, Massachusetts Institute of Technology, Cambridge, Mass., and John Wiley & Sons, New York. (QC601 B54c2)

Text provides an introduction to certain abstract concepts, including energy, momentum, electric and magnetic fields, conservation laws, impedance, and reactance.

2193* Modern Methods of Excitation Control for Large Synchronous Machines. A. H. Gray and D. R. Fenwick. *Electrical Energy*, v. 1, Sept. 1956, p. 17-24.

Three main types of automatic regulators associated with small machines; two principal designs used to control the excitation of the modern large machine.

2194* System Generated Overvoltages. I-II. J. R. Mortlock. *Electrical Energy*, v. 1, Oct. 1956, p. 44-50; Nov. 1956, p. 82-85.

Indicate the many possible mechanisms and where situation cannot be avoided, the methods of control or alleviation. Interruption of capacitive, magnetizing, and load current.

2195* Direct Rotor Cooling. A Review of Methods. I-II. V. Easton. *Electrical Energy*, v. 1, Oct. 1956, p. 51-54; Nov. 1956, p. 88-93.

Factors involved in design; a qualitative assessment of the several schemes; description of several existing types.

2196* Principle and Analysis of a Stabilized Phase Multiplier Type of Magnetic Frequency Convertor. E. Friedlander. *Electrical Energy*, v. 1, Oct. 1956, p. 55-60.

2197* Electrical Insulation. I. Dielectric Breakdown. J. H. Mason. *Electrical Energy*, v. 1, Nov. 1956, p. 68-75.

Factors which affect the electric strength and life of insulation in service are discussed in relation to mechanisms of breakdown by internal and surface discharges, thermal instability, and chemical deterioration. (To be continued.)

2198* Overload Protection of A. C. Motors. H. D. Langley. *Electrical Energy*, v. 1, Nov. 1956, p. 76-80.

Problems of protecting motors under conditions of excessive mechanical load, fluctuating load, locked rotor, and single-phase operation caused either by an open secondary circuit or by an open-circuit in the transformer primary.

2199 Characteristics of Tantalum Electrolytic Capacitors. Albert Lunchick and Emanuel Gikow. *Electrical Manufacturing*, v. 58, Dec. 1956, p. 79 + 10 pages.

Direct current leakage, dissipation factor, low-temperature characteristics, changes in high temperature, and effect of overvoltage and humidity are evaluated.

2200 Matching Shaft Speeds of D-C Motors. R. W. Volpe. *Electrical Manufacturing*, v. 58, Dec. 1956, 112-115.

Describes some circuit schemes taken from railroad practice.

2201 Wrapped Electrical Connections Made Automatically. S. J. Begun, F. Rosenthal, R. F. Krejci, and V. J. Galati. *Electrical Manufacturing*, v. 58, Dec. 1956, p. 126-133.

Solderless wrapped-wire connections and a mechanized wiring machine with code punched tape programming.

2202 Component Styling. Paul Wrablica, Jr. *Electrical Manufacturing*, v. 58, Dec. 1956, p. 134-135, 296, 298.

Industrial design techniques as applied to component styling.

2203 A Metal-Semiconductor Capacitor. R. L. Taylor and H. E. Haring. *Electrochemical Society, Journal*, v. 103, Nov. 1956, p. 611-613.

Porous $Ta/Ta_2O_5/MnO_2$ capacitor provides a higher capacitance per unit of volume than can be obtained with any other capacitor heretofore available. Small size makes it attractive for use in circuits requiring the ultimate in miniaturization.

2204 Rectifiers and Circuits for DC Relays. F. W. Parrish. *Electronic Design*, v. 5, Nov. 15, 1956, p. 22-25.

2205 Designing Iron-Core Inductances With Superimposed Direct Current. J. H. Davis. *Electronic Design*, v. 5, Nov. 15, 1956, p. 44-47.

2206* New Developments in Short Arc Lamps. Theodore C. Retzer and George W. Gerung. *Illuminating Engineering*, v. 51, Nov. 1956, p. 745-752.

Electrical characteristics, arc brightness, spectral energy distribution curves, and applications of the different lamps.

2207* The Digital Computer as an Aid to the Electrical Design Engineer. B. Birtwistle and Beryl M. Dent. *Institution of Electrical Engineers, Proceedings*, v. 103, pt. B, Suppl., no. 1, Apr. 1956, p. 47-53.

Examples relate to problems concerning impulse-voltage distribution on transformer windings, supply-frequency ripple on transductor performance, and the starting torque of a synchronous motor.

2208* A Bridge for the Measurement of Permittivity. A. M. Thompson. *Institution of Electrical Engineers, Proceedings*, v. 103, pt. B, no. 12, Nov. 1956, p. 704-709.

The direct admittance of a three-terminal capacitor with the sample as dielectric is measured as a complex capacitance, the two components being indicated directly on two three-terminal variable air capacitors. Transformer ratio-arms of very low effective impedance are used.

2209 Electric Strength of Saturated Hydrocarbon Gases. J. C. Devins and R. W. Crowe. *Journal of Chemical Physics*, v. 25, Nov. 1956, p. 1053-1058.

For a given electrode separation and pressure, electric strengths of normal alkanes increase with increasing chain length. Scattering cross sections are proportional to the number of C-H bonds in the molecule, and independent of the number of C-C bonds.

2210 The Elastic Dielectric. Richard A. Toupin. *Journal of Rational Mechanics and Analysis*, v. 5, Nov. 1956, p. 849-915.

General theory of stress in dielectrics.

2211* Three Simple Relay Circuits for the Comparison of Capacitance. A. E. Hawkins. *Laboratory Practice*, v. 5, Nov. 1956, p. 406-408.

Sensitive, precise circuits use high-speed, double changeover relays.

2212 Basic Methods of Adjusting Speed in AC and DC Electric-Motor Drives. B. Schwarz. *Machine Design*, v. 28, Nov. 29, 1956, p. 120-128.

A survey of basic methods.

2213 Precise Measurement of Relay Contact Pressures. P. W. ter Borg. *Philips Telecommunication Review*, v. 17, no. 1, Aug. 1956, p. 24-29.

Laboratory apparatus. Individual pressures of twin relay contacts can be measured with an accuracy of 0.2 g.

2214* Effective Mass Approximation for Excitons. G. Dresselhaus. *Physics and Chemistry of Solids*, v. 1, Sept.-Oct. 1956, p. 14-22.

The effective mass approximation for degenerate electronic energy bands is applied to the interaction of electrons and holes in an insulator.

2215* (German.) Selection of Optimum Geometric Dimensions for Electrical Machines. **Die Wahl Optimaler Geometrischer Abmessungen Elektrischer Maschinen.** I. M. Postnikow. 1955. VEB Verlag Technik, Berlin. (TK2189 P84w)

Textbook for engineering school students.

2216* Testing for Zero Leakage, in Canned Motors. R. E. Lawther. *Tool Engineer*, v. 37, Dec. 1956, p. 107-110.

Test equipment; high-helium, hydrostatic, and high vacuum test procedures.

2217* Fluctuation Noise. F. J. Hyde. *Wireless Engineer*, v. 33, Nov. 1956, p. 271-276.

A method of measuring current noise generated in temperature-sensitive solid-state devices, in narrow bandwidths about frequencies between 5×10^{-3} and 10^{-1} c.p.s.

See also: **2158** (electric field problems); **2169** (power system calculations); **2170** (switching system calculations); **2171** (transformer design); **2172** (electric traction problems); **2179** (transductor techniques); **2323** (electric utility costs); **2394** (electrical printing equipment); **2513** (electrical machine-tool controls); **2527** (steel-aluminum trolley wires); **2604** (corrosion of telephone cable); **2827** (resistance and magnetics at superconductivity transition); **2990** (electric system for nuclear reactor).

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2218 (German.) Anodic Oxidation of Aluminum. **Die Praxis der anodischen Oxydation des Aluminiums.** Walther W. G. Hübner and A. Schiltknecht. 407 p. 1956. Aluminium-Verlag, Düsseldorf. (TN775 H87p)

A handbook based on practical experience, including useful information on chemical and electro-polishing, dyeing, equipment and its use, and grinding parts in preparation for oxidation.

2219 Determination of the Number of Electrons Participating in the Electrochemical Reduction of Columbium and Titanium. E. I. Krylov and V. S. Kolevatova. *Henry Brutcher Translation No.* 3686, p 6. (From *Zhurnal Fizicheskoi Khimii*, v. 29, no. 5, 1955, p. 818-821.) Henry Brutcher, Altadena, Calif.

Previously abstracted from original. See item 12700, v. 4, Oct. 1955.

2220 Effect of Ultrasound Upon Electro-Deposition of Metals. A. Roll. *Henry Brutcher Translation No.* 3826, 8 p. (Abridged from *Metalloberflache*, v. 10, no. 8, 1956, p. 230-233.) Henry Brutcher, Altadena, Calif.

Previously abstracted from original. See item 14239, v. 5, Nov. 1956.

2221* (Russian.) Proportion Between the Solution Composition and Precipitate in the Electrodeposition of Two Component Alloys. **O sootnoshenii mezhdu sostavami rastvora i osadka pri elektroosazhdenii dvukhkomponentnykh splavov.** E. I. Akhumov and B. Ia. Rozen. *Doklady Akademii Nauk SSSR*, v. 109, no. 6, Aug. 21, 1956, p. 1149-1151.

Theoretical formulas of the above verify the experimental data.

2222* (Czech.) Electrolytic Polishing of Metals. **Elektrolytické leštenie kovov.** Ivan Hrivňák. *Hutnické Listy*, v. 11, no. 10, Oct. 1956, p. 599-611.

Explains the Jaquet-Rocquet theory and mechanism of polishing polyphase structures.

2223* Automatic Rinse-Tank Flow Control. J. B. Mohler. *Industrial Finishing (London)*, v. 9, Oct. 1956, p. 171-172.

Shows how automatic control of water flow cuts down the amount of water needed in electroplating.

2224* Electroplating on Beryllium. J. G. Beach and C. L. Faust. *Industrial Finishing (London)*, v. 9, Oct. 1956, p. 173-174.

The flowsheet shows the over-all operations used to electroplate on Be. Eight variations in the preliminary preparation were used without noticeable effect on the adhesion. The recommended procedure contains several precautionary operations that have not been fully evaluated.

2225 Hardness of Electrodeposited Tin-Nickel Alloy on Brass. V. R. Ramanathan. *Institute of Metal Finishing, Bulletin*, v. 6, Autumn 1956, p. 1-7.

Hardness determined by the microindentation technique. Thickness of coating is 16 times the depth of penetration.

2226 The Influence of Some Process Variables on the Reflectivity and Surface Appearance of Electrolytic Tinplate. R. Mills. *Institute of Metal Finishing, Bulletin*, v. 6, Autumn 1956, p. 8-17.

Increasing the temperature of the electrolyte and the relative cathode-electrolyte velocity result in an extension of the upper limit of current density at which acceptable coatings are produced.

2227 Chromium Plate Irregular Surfaces Uniformly. Louis Rosenberg. *Iron Age*, v. 178, Nov. 15, 1956, p. 144-146.

Anodes closely adjacent to the plating surface contribute to the highly uniform plating thicknesses possible on the irregular contours of gun tube bores. Higher amperage and bath temperature help also.

2228 High Speed Tinning Line Has Unique Features. J. W. Brinks. *Iron and Steel Engineer*, v. 33, Nov. 1956, p. 133.

Trouble shooting in the controller is simplified through use of a new memory-type fault finder which instantly detects and remembers location of circuit faults. High power density of 200 kw. per ft., coupled with fast response scanner regulator equipment works to assure that exactly the right amount of power is applied to the strip for flowing the tin.

2229* (French.) Porosity Dispersion in Electrolytic Coating. **Sur la dispersion de porosité des revêtements.** Maurice Bonnemay. *Journal de Chimie Physique*, v. 53, no. 9, Sept. 1956, p. 688-690.

Experimental data permit drawing of the frequency curve characterizing the porosity distribution of an electrolytic coating. The curve is projected by an extrapolation formula as a function of the thickness.

2230 Acidity Control in Zinc Electrolysis. Georg Steintveit. *Journal of Metals*, v. 8, Nov. 1956, p. 1542-1543.

The acidity control instrument described may be used as a time saving control method in any industry where a simple relation exists between conductivity of an electrolyte and the concentration of one of its constituents.

2231* (English.) **Study on Surface Electricity. XX. On Capacity Measurement of Dropping Mercury Electrodes by Resonance Method.** Akira Watanabe, Fukuju Tsuji, and Shizuo Ueda. **XXI. On the Structure of Interfacial Double Layer Considered from the Behaviour of Its Capacitance.** Akira Watanabe, Fukuju Tsuju, Tokuro Yasuda, and Shizuo Ueda. *Kyoto University, Institute for Chemical Research, Bulletin*, v. 34, Mar. 1956, p. 1-9, 65-73.

Results of interfacial double layer capacity measurements at bias voltage from 0 to -2.0 v. with various Hg-salt solution interfaces, and their explanation from the viewpoint of double layer structure.

2232 Selecting Electroplates for Iron Powder Parts. W. H. Safranek and M. W. Wirth. *Materials & Methods*, v. 44, Nov. 1956, p. 104-109.

A comprehensive investigation, where specific recommendations on bath formulations and detailed data are given on appearance, thickness and uniformity, salt spray resistance, and humidity resistance.

2233 Production of Smooth, Fine-Grained Electrodeposits. Some Theoretical Aspects and Principles. Gunner Gabrielson. *Metal Finishing*, v. 54, Nov. 1956, p. 52-55.

Some principles which explain how it has been possible to increase the rate of metal deposition from electroplating baths.

2234 Surface Treatment and Finishing of Light Metals. XII-A. Plating on Aluminum—Chemical Etching Processes. S. Wernick and R. Pinner. *Metal Finishing*, v. 54, Nov. 1956, p. 61-64.

Metals deposited on Al; difficulties connected with the plating; classification of methods; processes based on mechanical treatments; chemical etching processes; etches containing heavy metals.

2235 Batch Anodizing. M. Flusin. *Metal Industry*, v. 89, Nov. 16, 1956, p. 413-416.

Designs evolved for baskets, maintenance of satisfactory electrolyte temperature, preparatory treatment, bath conditions, drying and sealing, and arrangement of parts in the containers.

2236* (German.) Investigation of the Anodic Process of Aluminum Electropolishing by Means of Perchloric Acid-Alcohol Electrolytes. **Untersuchungen über den anodischen Prozess beim Elektropolieren von Aluminium mit dem Perchlorsäure-Alkohol-Elektrolyten.** V. Hansen and E. Knuth-Winterfeldt. *Metalloberfläche*, v. 10, no. 10, Oct. 1956, p. 299-300.

Describes experimental findings and discusses two existing hypotheses of the reaction mechanism.

2237 Nickel Electroforming. Dodd S. Carr. *Plating*, v. 43, Dec. 1956, p. 1422-1429.

Design, fabrication, and preparation of molds; selection of plating solution; building up Ni on the mold; improvement in plating baths; mold removal; machining and grinding applications.

2238* (Russian.) Galvanic Plating of Radiation Tubes With a Lead-Tin Alloy. **Galvanicheskoe pokrytie radiatornykh trubok svintsovo olovianistym splavom.** S. L. Voskoboinik. *Vestnik Mashinostroeniia*, v. 36, no. 10, Oct. 1956, p. 59-60.

New method uses less Pb and Sn than hot-dip method. It eliminates health hazards and forms a high-quality plating.

See also: **2112** (silvered Cu wire); **2114** (electrolytic coatings for Al); **2618** (preparation of Ca-Si and Al-Ca alloys); **2660** (electrolytic brightening); **2664** (electrochemical polishing); **2666** (coatings for Al); **2714** (strength of hard Cr coating); **2906** (metallography in electroplating); **2940** (structure of electrolytically polished surfaces).

ELECTRONICS

2239 The Possible Use of Semiconductor Devices in Aircraft. D. C. Brown. *Aircraft Engineering*, v. 28, Nov. 1956, p. 380-383.

Possible airborne applications for a range of new materials with unusual properties.

2240* (French.) Capacitors Subjected to Pulsed Voltage With Respect to Heating Effects. **Condensateurs soumis a des impulsions de tension prévision des échauffements.** J. Peyssou. *Annales de Radioelectricite*, v. 11, no. 46, Oct. 1956, p. 281-292.

Shows how to transpose from sinusoidal conditions to pulse conditions.

2241* (French.) A Wide-Band TR Tube With an Interdigital Line Incorporated. **Tube TR a large bande a ligne interdigitale incorporée.** D. Reverdin. *Annales de Radioelectricite*, v. 11, no. 46, Oct. 1956, p. 302-307.

Dimensions of the tubes are decreased by the interdigital line.

2242* A General Technique for Approximating Transient Response From Frequency Response Asymptotes. George A. Biernson. *Applications and Industry*, 1956, no. 27, Nov. 1956, p. 253-273.

2243* A Time-Dependent Nonlinear Compensating Network. John C. Clegg. *Applications and Industry*, 1956, no. 27, Nov. 1956, p. 306-308.

A network for improving the transient response of a.c. or d.c. servo-mechanisms.

2244 The Future of Loudspeaker Design. Norman H. Crowhurst. *Audio*, v. 40, Dec. 1956, p. 19-21, 71.

Some of the differences and the differing requirements of moving-coil and electrostatic loudspeakers. A possible arrangement which might lead to an entirely new configuration for the electrostatic unit.

2245 Increasing Sensitivity and Lowering Distortion in FM Tuners. Joseph Marshall. *Audio*, v. 40, Dec. 1956, p. 30, 32, 34, 84.

Additional gain and extra bandwidth can be added to an FM tuner by this outboard double-detection I.F. amplifier.

2246 Multiple Tape Copying. R. E. Baird. *Audio*, v. 40, Dec. 1956, p. 36, 78-79.

With the aid of a new simple chassis designed for a specific purpose, a radio station succeeded in reducing the time required in making multiple copies of tape recordings at a minimum of cost.

2247* A Method of Analyzing the Performance of Tandem-Connected Four-Teminal Networks. P. W. Seymour. *British Institution of Radio Engineers, Journal*, v. 16, Oct. 1956, p. 555-562.

A graphical technique for calculation purposes is introduced, and a simple example of the application of results is given.

2248* Influence of a Parasitic Aerial in a Rectangular Array. G. Boudouris. *British Institution of Radio Engineers, Journal*, v. 16, Oct. 1956, p. 571-584.

All the aerials making up the array are symmetrical half-wave dipoles parallel to one another and not displaced in the sense of their axes, and the system radiates in free space.

2249 Conference on Electroacoustics. *Henry Brutcher Translation No.* 3804, 8 p. (From *Akusticheskii Zhurnal*, v. 1, no. 3, 1955, p. 294-296.) Henry Brutcher, Altadena, Calif.

Seventeen reports presented at a Russian conference on electroacoustics, sound cinematography, sound recording, and related subjects.

2250 Transistors: A New Class of Relays. Ralph B. Brown and Ralph H. Beter. *Control Engineering*, v. 3, Dec. 1956, p. 70-76.

In a common emitter circuit with their base terminals as the input electrodes, alloy junction transistors and surface barrier transistors behave like single-contact relays.

2251* Magnetic Amplifiers. R. D. Pettit. *Electrical Energy*, v. 1, Sept. 1956, p. 6-11.

Mode of operation and basic constructional details of some commonly used amplifiers. Comparison between magnetic, electronic valve, and rotating types.

2252 Environmental Tests for Embedded Electronic Units. Charles A. Harper. *Electrical Manufacturing*, v. 58, Dec. 1956, p. 116-119.

Polyester- and epoxy-embedded units in relation to a particular set of requirements.

2253 Sequential Flow Cooling of Electronic Equipment. Paul Meissner. *Electrical Manufacturing*, v. 58, Dec. 1956, p. 120-125, 292, 294.

A forced-air cooling technique utilizing various patterns of component arrangement and associated blowers.

2254* Guides to Tube Selection. Keats A. Pullen, Jr. *Electronic Design*, v. 4, Nov. 1, 1956, p. 26-29.

Tables for selecting tubes; calculation of peak plate dissipation; current change in tube; selection of pentodes; design for reliability.

2255* Modern Synthesis Network Design From Tables. IV. Louis Weinberg. *Electronic Design*, v. 4, Nov. 1, 1956, p. 34-37.

High- and band-pass filters; band-elimination filters; transformation of symmetrical networks.

2256 Temperature Compensation Method for Transistor Amplifiers. Albert N. De Sautels. *Electronic Design*, v. 5, Nov. 15, 1956, p. 28-31.

Method uses temperature-sensitive resistance in an inverse feedback loop. Data verifying effectiveness are presented for three-stage direct-coupled and r-c coupled transistor amplifiers.

2257 Waveguide Hybrid Circuits and Their Use in Radar Systems. J. W. Sutherland. *Electronic Engineering*, v. 28, Nov. 1956, p. 464-469.

Principal types of wave-guide hybrid are described and their properties are compared. Balanced duplexers, balanced mixers and wave-guide switching, and adding and subtracting circuits are discussed.

2258 The Control of Thermionic Valve Envelope Quality by Thermal Shock Testing. G. D. Redston. *Electronic Engineering*, v. 28, Nov. 1956, p. 470-475.

Factors controlling the failures of all-glass valves in tests. Different thermal shock tests bring out different defects.

2259 Waveguide Surface Finish and Attenuation. I. J. Allison and F. A. Benson. *Electronic Engineering*, v. 28, Nov. 1956, p. 482-487.

Information is presented on the surface finishes of drawn, mechanically-lined, sprayed, cast, electroplated, electropolished, chemically-polished, and electroformed wave guides. (To be continued.)

2260 Computer Switching With Micro-Alloy Transistors. J. B. Angell and M. M. Fortini. *Electronic Industries & Tele-Tech*, v. 15, Dec. 1956, p. 38 + 4 pages.

Basic switching circuits employing transistors; characteristics important in switching applications.

2261 Transistorized Low-Level Chopper-Circuits. Richard B. Hurley. *Electronic Industries & Tele-Tech*, v. 15, Dec. 1956, p. 42 + 4 pages.

Advantages of speed, ruggedness, and life expectancy more than compensate for lower switching quality. Use of multiples and external stabilizing and compensating resistance is described.

2262 1957 Transistor Specifications. *Electronic Industries & Tele-Tech*, v. 15, Dec. 1956, p. 53-54, 57-58.

Latest technical specifications on the 317 transistors now being commercially marketed. Grouping is by manufacturer, and suggested areas of application are indicated.

2263 Electronics in the IGY Program. David A. Findlay. *Electronics*, v. 29, Dec. 1956, p. 138-142.

Projects planned for the International Geophysical Year will use electronic instrumentation to sense, record, and telemeter data. Earth satellite program will use transistorized oscillators for tracking and telemetering of data to ground from subminiature measuring equipment.

2264 Video Switching for TV Broadcast Centers. E. B. Pores. *Electronics*, v. 29, Dec. 1956, p. 146-149.

Unisolated, isolated, electron-tube isolated, resistance splitting, electronic, and beam-switching methods.

2265 Microwave Refractometer Predicts Propagation. C. M. Crain and C. E. Williams. *Electronics*, v. 29, Dec. 1956, p. 150-154.

Changes in radio-wave propagation at higher frequencies have been correlated with changes in refractive index of the atmosphere. The airborne microwave refractometer directly measuring refractive index profiles has become a powerful tool in propagation studies.

2266 Push-Pull Transistor Servo Amplifier. R. T. Henszey. *Electronics*, v. 29, Dec. 1956, p. 155-157.

Negative feedback keeps gain variations under 1 decibel from -55 to 100 C in servo amplifier using Si transistors in push-pull circuit that delivers 0.75 w. into transformer or 7.5 w. to saturable reactor.

2267 Transistorized Regulated Power Supply. Manfred Lillienstein. *Electronics*, v. 29, Dec. 1956, p. 169-171.

Design of transistor and diode power supplies for 60 c.p.s. provides 100-mv. regulation from zero to full load with 2.5 mv. ripple. Similar circuit for 400 c.p.s. input uses d.c. amplifier in feedback loop to control 4 paralleled power-transistor regulating elements providing 150 v. at 5 amp.

2268 Storage Tube Projects Radar PPI Display. Harry W. Gates. *Electronics*, v. 29, Dec. 1956, p. 172-175.

Remote indicator uses high-brightness projection tube with controllable long-time storage to provide 50-in. display for air-traffic-control systems.

2269 Scatter SSB Technique Uses Power Klystron. George M. W. Badger. *Electronics*, v. 29, Dec. 1956, p. 176-179.

Ultra-high frequency tropospheric point-to-point communication using single-sideband techniques requires high-power klystron capable of providing low distortion, good linearity, and high efficiency.

2270 Transistor Flip-Flops Have High Speed. A. K. Rapp and S. Y. Wong. *Electronics*, v. 29, Dec. 1956, p. 180-181.

Delay and transition times under loaded and unloaded conditions. Nonsaturating circuits and the effects of loading with zero to four transistor bases.

2271* (English and German.) Encyclopedia of Physics. **Handbuch der Physik. v. XXI.** Electron-Emission Gas Discharges I. **Elektronen-Emission Gasentladungen I.** S. Flügge, editor. 683 p. 1956. Springer-Verlag, Berlin. (QC21 G27h3)

Subjects covered include thermionic emission, field emission, motion of ions and electrons, formation of negative ions, photoionization in gases, ionization, and secondary effects.

2272* (German.) Device for Static Measurement and Oscillographic Presentation of Phase or Phase Time-Curve. **Ein Gerät zur statischen Messung und oszillographischen Darstellung der Phasen- oder Phasenlaufzeit-Kurve.** H. Schönfelder. *Frequenz*, v. 10, no. 10, Oct. 1956, p. 309-318.

Construction, use, performance, and selection of correct instrument.

2273* Time Sharing as a Basis for Electronic Telephone Switching. A Switched-Highways System. L. R. F. Harris. *Institution of Electrical Engineers, Proceedings*, v. 103, pt. B, no. 12, Nov. 1956, p. 722-742.

2274* An Investigation of Atmospheric Radio Noise at Very Low Frequencies. F. Horner and J. Harwood. *Institution of Electrical Engineers, Proceedings*, v. 103, pt. B, no. 12, Nov. 1956, p. 743-751.

This noise consists of a succession of impulses, discrete at the high field-strength levels but interfering at the low levels to form something more resembling fluctuation noise.

2275* An Experimental Assessment of the Linearity of a V.H.F. Transmitter. D. E. Hampton. *Institution of Electrical Engineers, Proceedings*, v. 103, pt. B, no. 12, Nov. 1956, p. 752-756.

An essentially non-linear source can be treated as a linear generator, and source admittance can be determined under normal operating conditions. Problem of matching source admittance to the characteristic admittance of the feeder connecting it to a wide-band aerial is considered.

2276* Some Aircraft Measurements of Beyond-the-Horizon Propagation Phenomena at 91·3 Mc/s. B. J. Starkey. *Institution of Electrical Engineers, Proceedings*, v. 103, pt. B, no. 12, Nov. 1956, p. 761-763.

Suggests that many phenomena of long-distance propagation might be explained by the simple hypothesis of specular reflection from temperature-inversion layers at the tropopause.

2277 Accurate Mathematical Treatment of the Analyzer of the RF Mass Spectrometer Tube. W. W. Cannon and M. K. Testerman. *Journal of Applied Physics*, v. 27, Nov. 1956, p. 1283-1286.

Equation was developed, using center grid of analyzer stage as reference point, that treats accurately the behavior of an ion in n-stage analyzer.

2278* Single-Component Stationary Electron Flow Under Space-Charge Conditions. B. Meltzer. *Journal of Electronics*, v. 2, ser. 1, Sept. 1956, p. 118-127.

2279* Secular Solution of Cyclotron Resonances for Electrons in Germanium. Louis Gold. *Journal of Electronics*, v. 2, ser. 1, Sept. 1956, p. 131-133.

A generalization of Shockley's relation for cyclotron resonance of electrons in semiconductors permits calculation of the resonant frequencies in n-Ge for any orientation of the magnetic field relative to the crystal axes.

2280* The Effect of High Electric Fields on the Absorption of Germanium of Microwave Frequencies. J. B. Arthur, A. F. Gibson, and J. W. Granville. *Journal of Electronics*, v. 2, ser. 1, Sept. 1956, p. 145-153.

The absorption of microwave radiation by Ge of suitable resistivity decreases at high electric fields.

2281* (French.) Transition Probabilties in a High Frequency Field of Variable Amplitude. **Probabilités de transition dans un champ haute fréquence d'amplitude variable.** J. P. Barrat and J. M. Winter. *Journal de Physique et le Radium*, v. 17, no. 10, Oct. 1956, p. 833-841.

Study of the distribution of a field in the form of a line. Approximating methods near the center or on the edges of the line of resonance allow a generalization of the results and a physical interpretation.

2282* (French.) Influence of Mechanical Stresses on Secondary Electron Emission of Polycrystalline Metallic Substances. **Influence des contraintes mécaniques sur l'émission électronique secondaire des substances métalliques polycristallines.** François Davoine and René Bernard. *Journal de Physique et le Radium*, v. 17, no. 10, Oct. 1956, p. 859-865.

Test showed that the coefficient of secondary emission d can grow up to 20% with Ni, Au, and Mo under the influence of plastic deformation. The initial value of d is restored by annealing.

2283* Modulation Products in Power-Law Devices. H. Kaufman. *Mathematics Magazine*, v. 30, Sept.-Oct. 1956, p. 9-17.

Analysis of relations among the harmonics in the output of a biased ν-th law device with a two-frequency input.

2284 Mechanical Design for Electronic Engineers. R. H. Garner. 223 p. 1956. George Newnes Ltd., London. (TK7870 G18m)

Standard rack systems; apparatus cabinets; chassis and subpanel construction; accessibility for servicing; ventilation and cooling; anti-vibration mountings; sheet-metal working; finishing processes; printed circuits and printed components; potting of components.

2285 A 20-MeV Betatron for X-Ray Therapy. D. Major, F. R. Perry, and K. Phillips. *Metropolitan-Vickers, Research Series, No.* 23, Mar. 1956, 14 p. (TK1 M56r Contin.)

Principle of operation; description of equipment; machine performance; medical application.

2286* (German.) The Measurement of the Scatter Coefficient for the Backward Scatter of Short-Wave Telegraphy Signals. **Über die Messung des Streukoeffizienten bei der Rückstreuung von Kurzwellen-Telegraphiesignalen.** B. Beckmann and K. Vogt. *NTZ; Nachrichtentechnische Zeitschrift*, v. 9, no. 10, Oct. 1956, p. 441-448.

Backward scatter coefficient for the maximum amplitude of the backward scatter is measured with a MUSA-antenna.

2287* (German.) The Transmission Constants of a Network With a Given Transient Response. **Das Übertragungsmass von netzwerken mit vorgeschriebenem Einschwingvorgang.** V. Fetzer. *NTZ; Nachrichtentechnische Zeitschrift*, v. 9, no. 10, Oct. 1956, p. 462-468.

Discusses low-pass and band-pass filters with relatively narrow passband.

2288 The Oscilloscope at Work. A. Haas and R. W. Hallows. 171 p. 1954. Philosophical Library, New York. (TK7872.C27 H11o)

Deals mainly with uses of the instrument and correct interpretation of oscillograms. Contains valuable information on oscilloscope circuits, construction, and adjustment.

2289 Automatic Tuning Mechanisms Using Instantuners Type SZT 201 and/or 202. W. L. Vervest and L. van Gorkom. *Philips Telecommunication Review*, v. 17, no. 1, Aug. 1956, p. 2-16.

A radio transmitting and/or receiving installation can be tuned to one of twelve present frequencies merely by moving a selector switch to the corresponding position. Remote control is possible.

2290 Acoustodynamic Effects in Semiconductors. Gabriel Weinreich. *Physical Review*, v. 104, ser. 2, Oct. 15, 1956, p. 321-324.

The interaction of particles with acoustic waves leads to certain effects which, at least at L.F., are peculiar to semiconductors; these include a (complex) addition to the elastic modulus and the acoustoelectric effect.

2291 Scattering of Holes by Phonons in Germanium. H. Ehrenreich and A. W. Overhauser. *Physical Review*, v. 104, ser. 2, Oct. 15, 1956, p. 331-342.

The transition probabilities for scattering are presented in a form which can be applied readily to the transport properties of Ge.

2292 Lattice-Scattering Mobility of Holes in Germanium. H. Ehrenreich and A. W. Overhauser. *Physical Review*, v. 104, ser. 2, Nov. 1, 1956, p. 649-659.

2293 On the Theory of Plasma Waves. F. Berz. *Physical Society, Proceedings*, v. 69, no. 441B, Sept. 1956, p. 939-952.

Waves can be divided into two groups; those which depend on the conditions of excitation and those whose dispersion characteristics are solely determined by the stationary electron density and the stationary electron velocity distribution of the plasma.

2294* The Hall Effect in the Silver-Palladium Alloy System. A. L. Schindler. *Physics and Chemistry of Solids*, v. 1, Sept.-Oct. 1956, p. 42-44.

The effective number of conduction electrons calculated using a one-band model is compared with that obtained for the Cu-Ni alloy system and a similarity in behavior is found.

2295* Thermal Acceptors in Germanium. Harry Letaw, Jr. *Physics and Chemistry of Solids*, v. 1, Sept.-Oct. 1956, p. 100-116.

Acceptors are identified as vacancies with a 2 e.v. energy of formation. Annealing of thermally introduced acceptors is described by a mechanism involving the formation of divacancies as the first step.

2296 Stabilizing Feedback Amplifiers. Norman H. Crowhurst. *Radio-Electronics*, v. 27, Dec. 1956, p. 34-37.

Types of oscillations and conditions producing them; stability criterion.

2297 Key to Color TV Installation and Servicing. W. W. Cook. *Radio & Television News*, v. 56, Dec. 1956, p. 52-53, 55, 179.

2298 Accurate Method for Measurement of Microwave Attenuation. J. A. Fulford and J. H. Blackwell. *Review of Scientific Instruments*, v. 27, Nov. 1956, p. 956-958.

Change in microwave power fed to a thermistor is compared with an equal amount of L.F. power supplied to the same thermistor through a precision attenuator pad.

2299 Transistors and Crystal Diodes. B. R. Bettridge. 72 p. 1956. Norman Price Ltd., London. (QC544.T3 B45t2)

What they are and how to use them.

2300 A Low 215-225 Mc Converter. Lawrence Hoffman. *U. S. Naval Research Laboratory, NRL Report* 4765, June 1956, 6 p. (T21 Un3.5n Contin.)

Noise figure of the unit is 3.0 ± 0.2 decibles over the entire band. Bandwidth is in excess of one Mc. and output frequency is 30 Mc. Optimum source and output impedances are each 50 ohms.

2301 Vacuum Tube Circuits and Transistors. Lawrence Baker Arguimbau and Richard Brooks Adler. 646 p. 1956. John Wiley and Sons, New York.

A rigorous examination of basic physical principles, designed to be easily understood by beginners, yet useful to mature people in industry.

2302* Scattering of Microwaves by Long Dielectric Cylinders. Albert W. Adey. *Wireless Engineer*, v. 33, Nov. 1956, p. 259-264.

Near-field results for the scattering of 3-cm. waves by dielectric rods of circular, square, and rectangular cross-section.

2303* (German.) Certain Investigations of Silver Iodide in Respect to Formation of Holes. **Uber einige Untersuchungen am Silberjodid im Hinblick auf die Fehlordnung. II.** Formation of Holes in β-AgI. **Die Fehlordnung im β-AgI.** K. H. Lieser. *Zeitschrift für Physikalische Chemie (Frankfurt)*, v. 9, nos. 3-4, Nov. 1956, p. 216-227.

2304* (Russian.) The Effects of Impurities on the Electrical Properties of Lead Telluride. **Vliianie primesei na elektricheskie svoistva telluristogo svintsa.** T. L. Kovalchik and Iu. P. Maslakovets. *Zhurnal Tekhnicheskoi Fiziki*, v. 26, no. 11, Nov. 1956, p. 2417-2431.

Effects of various impurities on conduction of this semiconductor. A significant increase in the concentration of free electrons is possible only by adding a double impurity, for example Br and Pb. Relation between temperature of heat treatment and the concentration of carriers.

2305* (Russian.) Measuring the Rate of Surface Recombination in a Thin Semiconductor Specimen With Qualitatively Different Faces. **Ob izmerenii skorosti poverhnostnoi rekombinatsii v tonkom poluprovodnikovom obraztses kachestvenno razlichnymi graniami.** O. V. Sorokin. *Zhurnal Tekhnicheskoi Fiziki*, v. 26, no. 11, Nov. 1956, p. 2467-2472.

Simple and convenient method permits studying effects of ion and electron bombardment on the rate of surface recombination in Ge; the effect of an external electric field, and of certain chemical admixtures.

See also: **2191** (communication engineering); **2203** (metal-semiconductor capacitor); **2217** (fluctuation noise); **2412** (transistorized temperature indicator); **2967** (diffusion in PbTe); **3201** (rubber in electronics).

ENGINEERING ECONOMICS

2306* Fuels for Water Transportation in the Soviet Union. Bernard M. Kassell. *American Society of Naval Engineers, Journal*, v. 68, Nov. 1956, p. 647-652.

Past and future developments in the production of various types of fuels; data on sources and quality.

2307* Trends in Residential Water Use. Ross Hanson and Herbert E. Hudson, Jr. *American Water Works Association, Journal*, v. 48, Nov. 1956, p. 1347-1358.

Per capita consumption can best be expressed as the amount of water sold to residential users, divided by the product of the number of services and the number of persons per service connection. An increase in unit residential uses of water will cause a continuing rise in demand.

2308* A Comment on the Construction of Price Index Numbers. K. S. Banerjee. *Applied Statistics*, v. 5, Nov. 1956, p. 207-210.

Computation of unbiased estimates of price averages.

2309 Bituminous Coal Trends. 164 p. 1956. National Coal Assn., Washington, D. C. (TN825 N21b*)

Statistics on requirements, uses, markets, production, transportation, labor, safety, research, and reserves.

2310 Facts and Figures for the Chemical Process Industries. Maurice F. Crass, Jr. and Marjorie V. Campbell. *Chemical and Engineering News*, v. 34, Nov. 19, 1956, p. 5624-5700.

Several papers dealing with chemical and allied firms' net sales; value of U. S. minerals; inorganic chemical capacities; plastics increase in synthetic organic production; chemical specialties; new pattern for world chemical trade.

2311 What Does Corrosion Really Cost? W. B. Hirschmann. *Corrosion*, v. 12, Dec. 1956, p. 644-646.

By taking into account the effects of taxes and the time value of money, a measure is obtained of the cost of corrosion which is credible, and is meaningful in relation to other costs and the net earnings of an organization.

2312 Digest of Brazilian Taxes and Business Organization. Walter H. Diamond. 63 p. 1956. Matthew Bender & Co., Albany. (HJ2521 D54d Over.)

How to organize Business Enterprises. What the investor should consider. Individual taxes. Company taxes. Specific tax advantages available. Labor laws. Patent and trade mark laws.

2313* (French.) Concerning the Second Modernization and Re-Equipping Plan. **A propos du deuxième plan de modernisation et d'équipement. III.** Liquid Fuels. **Les combustibles liquides.** Coudé du Foresto. *Flamme et Thermique*, v. 9, no. 97, Oct. 1956, p. 35-43.

Consumption of liquid fuels in France and its colonies in 1952 and 1957; possible improvement.

2314 India's Mineral Wealth. J. Coggin Brown and A. K. Dey. 3rd Ed. 761 p. 1955. Oxford University Press, London. (TN103 B81i3)

Each useful mineral found in India, Burma, or Pakistan is considered individually, its chief occurrences described, the history of its commercial exploitation outlined, and its future prospects assessed.

2315* Energy Supply and Usage in Australia. W. H. Spooner. *Institute of Fuel, Journal*, v. 29, Nov. 1956, p. 456-459.

2316* The Fuel and Energy Requirements of the Steel Industry. W. H. Brook. *Institute of Fuel, Journal*, v. 29, Nov. 1956, p. 465-471.

Requirements of the blast furnace, coke oven, open-hearth furnace, and rolling mill. Power and steam requirements and generation.

2317* The Future Development of the Gas Industry in Australia. C. C. Challis. *Institute of Fuel, Journal*, v. 29, Nov. 1956, p. 471-478.

2318* The Place of Atomic Power in the Australian Fuel Position. J. P. Baxter. *Institute of Fuel, Journal*, v. 29, Nov. 1956, p. 482-488.

Research and development programs; cost of production; future power and fuel requirements.

2319* Problems of Fuel Production and Utilization in New Zealand. J. Ivon Graham. *Institute of Fuel, Journal*, v. 29, Nov. 1956, p. 504-511.

2320* The Economics of Farming by Electricity. W. J. Guscott. *Institution of Electrical Engineers, Journal*, v. 2, Nov. 1956, p. 646-654.

Farm use of electricity has proved beneficial to all concerned. Acceleration of the change to electrical machinery depends on overcoming the traditional reluctance of many farmers to invest much more than the bare minimum in re-equipping their farms.

2321 Team Research in Fertilizer Economics. Odin Wilhelmy, Jr., Lawrence L. Lortscher, and George F. Sachsel. *Journal of Agricultural and Food Chemistry*, v. 4, Nov. 1956, p. 920-924.

An analysis of the problems faced by fertilizer manufacturers indicates the need for a group of experts to gather and analyze the date that management needs to make intelligent decisions. Three case histories show the effectiveness of the team approach..

2322 The Cyclical Movement of Steel Scrap Prices. Chapin Hoskins. *Journal of Metals*, v. 8, Dec. 1956, p. 1651-1653.

For over 50 yrs. scrap steel price has risen and fallen cyclically. Cycles can be effectively measured in terms of rate of change and are related to cycles in other prices and business activity.

2323* The Problem of Allocating Capacity Cost. Ralph K. Davidson. *Land Economics*, v. 32, Nov. 1956, p. 334-356.

An economic allocation of capacity cost for electric utilities is developed; various alternative methods of allocating capacity cost are analyzed and compared with an economic allocation.

2324 Aluminium in the Economy of the United Kingdom. W. J. Thomas. *Light Metals*, v. 19, Nov. 1956, p. 344-347.

Production, consumption, and uses.

2325* (Russian.) Reducing Production Costs of Electric Steel Melting. **Snizhenie sebestoimosti vyplavki elektrostali.** A. F. Kablukovskii. *Metallurg*, 1956, no. 10, Oct. 1956, p. 14-17.

A commercial process was studied in order to improve the furnace production, quality and output of metal, and the consumption of electric energy.

2326* Current Economic Developments in Europe. United Nations Economic Bulletin for Europe, v. 8, no. 2, Aug. 1956, p. 1-40.

Trends of production and demand; conditions in metal-using industries; effects of the boom on internal price levels and on balances of payments; impact of deflationary policies; industry and agriculture in the Soviet Union and Eastern Europe.

FLUID MECHANICS

2327* On the Transfer of Energy in Burgers' Model of Turbulence. W. H. Reid. *Applied Scientific Research*, v. 6, sec. A, nos. 2-3, 1956, p. 85-91.

Due to the absence of a pressure term, Burgers' equation does not lead to an algebraic behavior of the correlation functions for large separations .In general, energy is transferred not only forward to higher wave numbers but also backwards to smaller wave numbers.

2328* Heat Transfer in Turbulent Tube Flow. H. L. Beckers. *Applied Scientific Research*, v. 6, sec. A, nos. 2-3, 1956, p. 147-190.

General solutions for the differential equations valid in each of three layers of tube cross-section. Heat transfer and temperature distribution for a homogeneous entrance temperature.

2329 Heat-Conduction Methods in Forced-Convection Flow. S. Levy. *ASME, Transactions*, v. 78, Nov. 1956, p. 1627-1635.

Transient heat-conduction solutions are used to determine the thermal characteristics of fluid flowing in circular conduits, annuli, and between parallel plates.

2330 Effect of Vapor Velocity on Laminar and Turbulent-Film Condensation. W. M. Rohsenow, J. H. Webber, and A. T. Ling. *ASME, Transactions*, v. 78, Nov. 1956, p. 1637-1643.

Analyses show effect on rates of condensation of vapor shear stress at liquid-vapor interface. Both laminar and turbulent films are considered.

2331 Turbulence and Boundary-Layer Effects on Cavitation Inception From Gas Nuclei. J. W. Daily and V. E. Johnson, Jr. *ASME, Transactions*, v. 78, Nov. 1956, p. 1695-1706.

Involves the role of gas bubbles as nuclei for cavitation and the interrelation of the stability of small gas bubbles, their size and space distribution, and the velocity and pressure variations in the layer.

2332 A Correlation Between the Dynamic Properties of a Pair of Impinging Streams and the Uniformity of Mixture-Ratio Distribution in the Resulting Spray. Jack H. Rupe. *California Institute of Technology, Jet Propulsion Laboratory, Progress Report No.* 20-209, Mar. 1956, 15 p. (TL501 C12p Contin.)

The most uniform distribution of the weight ratio of the two components in the spray produced by a pair of impinging streams is attained when the product of velocity head ratio and the diameter ratio for the two streams is unity.

2333 A Dynamic-Head Probe for Evaluating the Properties of Free Liquid Jets. Jack H. Rupe. *California Institute of Technology, Jet Propulsion Laboratory, Progress Report No.* 20-299, May 1956, 15 p. (TL501 C12p Contin.)

2334* Heat Transfer Between Tubes and a Fluid Flowing Through Them With Varying Degrees of Turbulence Due to Entrance Conditions. V. C. Davies and M. Al-Arabi. *Institution of Mechanical Engineers, Proceedings*, v. 169, no. 48, 1955, p. 993-1006.

An electrically heated tube was arranged to give the local, as well as the average, heat transfer between the tube and water, for both normal and abnormal turbulent conditions.

2335* Flow of a Compressible Fluid Through a Sudden Enlargement in a Pipe. W. B. Hall and E. M. Orme. *Institution of Mechanical Engineers, Proceedings*, v. 169, no. 49, 1955, p. 1007-1020.

2336 Effect of Vibrations on the Motion of Small Gas Bubbles in a Liquid. H. H. Bleich. *Jet Propulsion*, v. 26, Nov. 1956, p. 958-964.

Basic equations for the motion of small gas bubbles in an inviscid liquid in the presence of harmonic vibrations; mechanism which may make bubbles move contrary to gravity forces.

2337 Laminar Jet Mixing of Two Compressible Fluids With Heat Release. S. I. Pai. *Journal of the Aeronautical Sciences*, v. 23, Nov. 1956, p. 1012-1018.

Fundamental equations; simplified solutions of specific problems.

2338 Shock Waves in Chemical Kinetics: Further Studies on the Rate of Dissociation of Molecular Iodine. Doyle Britton, Norman Davidson, William Gehman, and Garry Schott. *Journal of Chemical Physics*, v. 25, Nov. 1956, p. 804-809.

Rate constants for the process $I+I+M \rightarrow I_2+M$ decrease with increasing temperature. M represents a "third Body" gas molecule.

2339* On the Flux of Eddy Energy in Small-Scale Turbulent Motion. Warren A. Dryden. *Journal of Meteorology*, v. 13, Oct. 1956, p. 433-447.

Several previous small-scale turbulence experiments are reanalyzed. Experiment involving an axially symmetric, low speed, free jet of air is described, and the data are fitted to an idealized model in order to simplify study of the relative flux.

2340* (French.) Quadrupolar Resonance in Liquids. **La résonance quadrupolaire dans les liquides.** Joseph Seiden. *Journal de Physique et le Radium*, v. 17, no. 10, Oct. 1956, p. 876-886.

Studied in liquids and some solids. Resonance is absent from liquids in which the molecular movements are rapid and isotropic. It decreases with rapid anisotropic movements as in nematic liquids. Lines of slow molecular movements were examined in viscous liquids.

2341 Entropy Changes in Rarefaction Waves. Robert F. Dressler. *Journal of Research, National Bureau of Standards*, v. 57, Nov. 1956, p. 265-271.

Frictional flow of a polytropic gas is investigated for centered rarefaction waves.

2342 Turbulent Concentration Fluctuations Through Electrical Conductivity Measurements. J. M. Prausnitz and R. H. Wilhelm. *Review of Scientific Instruments*, v. 27, Nov. 1956, p. 941-943.

A calibrated conductivity cell is used to measure the conductivity of a small volume surrounding a fixed point in a turbulent fluid.

2343 An Investigation of the Flow in Malifolds With Open and Closed Ends. J. H. Horlock. *Royal Aeronautical Society, Journal*, v. 60, Nov. 1956, p. 749-753.

Solution may be obtained in terms of the ratio of the velocity along a manifold to the normal discharge velocity.

2344 The Instability of a Layer of Fluid Heated Below and Subject to the Simultaneous Action of a Magnetic Field and Rotation. II. S. Chandrasekhar. *Royal Society, Proceedings*, v. 237, ser. A, Nov .20, 1956, p. 476-484.

A previously developed theory is extended to include the possibility that the fluid layer can become unstable via a marginal state of purely oscillatory motions.

2345 Integration of the Boundary-Layer Equations. D. Meksyn. *Royal Society, Proceedings*, v. 237, ser. A, Nov. 20, 1956, p. 543-559.

The integral is evaluated by the method of steepest descent.

2346 Particular Solutions for Flows at Mach Number 1. Max A. Heaslet and Franklyn B. Fuller. *U. S. National Advisory Committee for Aeronautics, Technical Note* 3868, Nov. 1956, 32 p. (TL570 Un3t)

The small-disturbance equation for flow at Mach number one is studied with the objective of determining closed analytic solutions representing possible fluid motions.

2347* Concentric Orifice Diameters. Alexander Goldstein. *Water & Sewage Works*, v. 103, Nov. 1956, p. 515-521.

Methods for determining orifice diameters for vena contracta taps; pertains to incompressible flow.

2348* (English.) **The Pulsating Viscous Flow Superposed on the Steady Laminar Motion of Incompressible Fluid in a Circular Pipe.** Shigeo Uchida. *Zeitschrift für Angewandte Mathematik und Physik*, v. 7, no. 5, Sept. 1956, p. 403-422.

An exact solution.

See also: **1735** (incompressible nonviscous flow); **2037** (chemical reactions in hydrodynamic flows); **2068** (laminar boundry layer flow); **2176** (gas flow control); **2416** (flow in rocket nozzles); **2475** (design of fan orifice).

FOOD TECHNOLOGY

2349* Acceptability of Irradiated Foods. II. Virginia E. McGary and Margaret E. Shipman. *American Dietetic Association, Journal*, v. 32, Nov. 1956, p. 1059-1063.

Humans were fed irradiated foods in three balance studies; acceptability data was obtained.

2350* Extraction and Utilization of Carotenes and Xanthophylls. Everette M. Burdick. *Economic Botany*, v. 10, July-Sept. 1956, p. 267-279.

Describes commercial extraction of these vitamin A sources from alfalfa, carrots, and palm oil.

2351 This Unit Puts Freeze-Drying Right on the Processing Line. *Food Engineering*, v. 28, Nov. 1956, p. 40-41, 143.

British vacuum dryer sets new high in quality of dehydrates. Operation guards foods' flavor and nutrients, permits full reconstitution.

2352* Treatment of Wheat With Ionizing Radiations. III. The Effect on Breadmaking and Related Properties. Max Milner and Yin-chao Yen. *Food Technology*, v. 10, Nov. 1956, p. 528-531.

Gamma irradiation of winter wheat in dosage range lethal to insects and to fungal respiration caused decreases in germination but no immediate change in fat acidity, protein solubility, or fluorescence of acid extracts.

2353* Use of Antibiotics in Prolonging Storage Life of Dressed Chicken. John C. Ayres, Homer W. Walker, Mary Jeanne Fanelli, Albert W. King, and Fred Thomas. *Food Technology*, v. 10, Nov. 1956, p. 563-568.

Effect of dipping eviscerated poultry in antibiotic and antifungal solutions was tested. Agents used were: chlortetracycline, oxytetracycline, tetracycline, streptomycin, neomycin, aerosporin, rimocidin, mycostatin, and ascosin.

2354* Review of Older Methods for Treating Food Processing Wastes. Robert S. Ingols. *Industrial Wastes*, v. 1, Nov.-Dec. 1956, p. 288-290.

Constituents of canning wastes; screening; trickling filters; anaerobic digestion.

2355 Cereal Storage Effects, Storage Changes in Parboiled Rice. David F. Houston, Irving R. Hunter, and Ernest B. Kester. *Journal of Agricultural and Food Chemistry*, v. 4, Nov. 1956, p. 964-968.

At 100 and 140 F changes appeared after 3 to 4 months due to nonenzymatic browning, accompanied by losses of reducing sugars, amino nitrogen, and free amino acids. Analyses were too insensitive to follow browning during storage.

See also: **1896** (analysis of fresh meat).

FUELS AND COMBUSTION

2356* (French.) Inquiry About Petroleum Residue Gasification. **Enquête sur la gazéification du mazout.** G. Namy. *Centre de Documentation Sidérurgique, Circulaire d'Informations Techniques*, v. 13, no. 10, 1956, p. 1983-2008.

The theory and advantages of the petroleum residue gas generator; equipment and refractory material used in various plants; description of various generators. Quality of the gas and coke deposit.

2357 Hydrazine Decomposition Flames at Subatmospheric Pressures. A. R. Hall and H. G. Wolfhard. *Faraday Society, Transactions*, v. 52, Nov. 1956, p. 1520-1525 + 1 plate.

Burning velocity; visual and spectrographic observations of flame structure.

2358 Yellow-Tipping of Bunsen Burner Flames and Related Exchangeability of Fuels in Gas Utility Systems. Joseph Grumer, Margaret E. Harris, and Valeria R. Rowe. *Industrial and Engineering Chemistry*, v. 48, Nov. 1956, p. 2052-2062.

Method for predicting the exchangeability of fuel gases in gas-distribution systems.

2359 Combustion in the Mixing Zone Between Two Parallel Streams. F. H. Wright and J. L. Becker. *Jet Propulsion*, v. 26, Nov. 1956, p. 973-978.

Explanation of bluff body flame stabilization and blowoff.

2360 Gaseous Detonations. IX. A Study of the Reaction Zone by Gas Density Measurements. G. B. Kistiakowsky and P. H. Kydd. *Journal of Chemical Physics*, v. 25, Nov. 1956, p. 824-835.

2361* (Russian.) Low Temperature Properties of Hydrocarbon Fuels. **Nizkotemperaturnye svoistva uglevodorodnykh topliv.** Ia. B. Chertkov and V. N. Zrelov. *Khimiia i Tekhnologiia Topliva*, 1956, no. 10, Oct. 1956, p. 14-18.

A nomogram for determination of the crystallization temperature of mixtures of fuels and of their fractions. Tests were applied to bulk fuels of oil refineries.

2362* (Russian.) Semicoking of Hard Fuels in an Active Gaseous Medium at High Pressure. **Polukoksovanie tverdykh topliv v aktivnoi gazvoi srede pod visokim davleniem.** V. S. Al'tshuler and G. S. Shafir. *Khimiia i Tekhnologiia Topliva*, 1956, no. 10, Oct. 1956, p. 45-53.

The influence of a gaseous medium on the semi-coking of hard fuels under pressure was tested. Esthonian schist and Ukrainian brown coal were used in a H and steam medium at pressures up to 100 atmospheres.

2363* (Czech.) Evaluating Coke for Blast Furnaces. **Hodnocení koksu pro vysoké pece. III.** A New Method of Evaluating Coke. **Novy způsob hodnocení koksu.** O. Havel and V. Řeřábek. *Paliva*, v. 36, no. 10, Oct. 1956, p. 329-334.

Evaluates present methods and compares mechanical testing methods and their inadequencies. Suggests simple method of evaluation to determine firmness, quantity of fragmentation, fragmentation resistance, and over-all quality.

2364* (Czech.) Investigation of the Ignition of Solid Fuel. **Přístroj pro výzkum spodního zápalu tuhých paliv.** L. Salogub and A. Kunc. *Prace Ustavu pro Vyzkum a Vyuziti Paliv*, v. 6, nos. 10-15, 1954, p. 85-115.

2365* (Czech.) The Determination of the Coking Properties of Coal. **Výzkum koksovacích vlastností uhlí.** B. Tejnicky. *Prace Ustavu pro Vyzkum a Vyuziti Paliv*, v. 5, nos. 1-9, 1955, p. 45-65.

Plasticity, swelling number, and relative and absolute caking power are tabulated for six typical coals.

2366 (French.) Investigation of the Combustion of a Mixture of Hydrocarbons. **Recherche sur la combustion d'un mélange d'hydrocarbures.** Jean Rappeneau. *Publications Scientifiques et Techniques du Ministere de l'Air*, 1956, no. 318, 90 p. (TL502 F84.1p Vis.)

Kerosene combustion in air was studied by determining the concentration of the combustion products, the temperature, and the combustion efficiency. The tests were performed in the combustion chamber of a turbojet engine. Flame and vaporization characteristics of the kerosene were determined.

2367* (French.) A Second Underground Gasification Attempt at Djerada, Morocco. **Deuxième essai de gazéification souterraine de Djérada.** R. Naudet. *Revue de l'Industrie Minérale*, v. 38, no. 647, Oct. 1956, p. 571-602.

The test was characterized by more coal output, a longer uninterrupted operation, and greater blowing capacity. Advantages and disadvantages of underground gasification.

2368 Growth of Disturbances in a Flame-Generated Shear Region. Perry L. Blackshear, Jr. *U. S. National Advisory Committee for Aeronautics, Technical Note* 3830, Nov. 1956, 148 p. (TL570 Un3t)

Stability analysis of the flow field arising from a flame in a duct.

2369 Stability Limits and Burning Velocities of Laminar Hydrogen-Air Flames at Reduced Pressure. Burton Fine. *U. S. National Advisory Committee for Aeronautics, Technical Note* 3833, Nov. 1956, 29 p. (TL570 Un3t)

See also: **1830** (fuel-gas handbook); **1924** (fuel-gas analysis); **2080** (flames in H_2O_2 vapor); **2317** (Australian gas industry); **2319** (fuel production in New Zealand); **2624** (combustion in open-hearth furnace).

GEOLOGY, GEOPHYSICS, MINERALOGY, AND MINING ENGINEERING

2370* **Marginal Sediments of Mississippi Delta.** Francis P. Shepard. *American Association of Petroleum Geologists, Bulletin*, v. 40, Nov. 1956, p. 2537-2623.

Approximately 1,000 samples were obtained from distributary mouths, continental shelf east of the delta, continental slope to depths of 550 ft., and Breton Sound. It was found that sedimentary environments follow several natural subdivisions.

2371* **Use of Quantitative Fluorescence Measurements in Drilling Operations.** H. Zierfuss and D. J. Coumou. *American Association of Petroleum Geologists, Bulletin*, v. 40, Nov. 1956, p. 2724-2734.

A fluorimeter with which the intensity of the fluorescence can be measured permits a relative determination of the oil content of samples.

2372* (Russian.) "Extremum" Controller for Turbine Drilling of Oil Drill-Holes. **Extremum Reguliator dlia turbinnoga bureniia neftianykh skvazhin.** Iu. I. Ostrovskii and M. G. Eskin. *Avtomatika i Telemekhanika*, v. 17, no. 9, Sept. 1956, p. 775-788 + 2 plates.

Analysis of corrective circuits for automatic optimum control of maximum mechanical speed.

2373* **Hydraulic Filling in Metal Mines.** E. A. Sobering. *Canadian Mining and Metallurgical Bulletin*, v. 49, no. 535, Nov. 1956, p. 784-792.

A system used to fill underground excavations with a dense pulp. Methods, materials, advantages, techniques, and costs of filling.

2374 Coastal Engineering Instruments. R. L. Wiegel, editor. 302 p. 1956. Council on Wave Research, University of Calif., Richmond. (TA165 C76p)

Series of papers reporting on many of the instruments used to obtain data necessary to the design of coastal structures, ships, and seaplanes.

2375* **Is Anthraxolite Related Genetically to Coal or to Oil.** R. V. Dietrich. *Economic Geology*, v. 51, Nov. 1956, p. 649-664.

Ash content may be suggestive as to the consanguinity between the solid high-carbon compounds in question and oil or coal.

2376* **Carbonatites. A Review.** W. T. Pecora. *Geological Society of America, Bulletin*, v. 67, Nov. 1956, p. 1537-1555.

Review stresses the field and geochemical relationships of the carbonatites and alkalic igneous rocks and concludes that carbonatites were deposited by carbonatic solutions having a wide range of temperature, pressure, and concentration and derived from alkalic magmas during the process of silicate crystallization.

2377* **Radio Astronomy and the Jodrell Bank Telescope.** A. C. B. Lovell. *Institution of Electrical Engineers, Proceedings*, v. 103, pt. B, no. 12, Nov. 1956, p. 711-721.

Some scientific characteristics of a 250-ft. aperture steerable radio telescope. Background of research problems for which it will be used.

2378* **Some Vector and Arithmetic Operations on Two-Dimensional Orientation Variates, With Applications to Geological Data.** Howard J. Pincus. *Journal of Geology*, v. 64, Nov. 1956, p. 533-557.

2379* **Instantaneous and Continuous Wind Measurements up to the Higher Stratosphere.** Gerhard H. R. Reisig. *Journal of Meteorology*, v. 13, Oct. 1956, p. 448-455.

Method of measuring wind velocity as actually encountered during guided missile flight. Instantaneous vertical wind gradients are derived which represent true physical quantities.

2380 The Reservoir Mechanism of Sulfur Recovery. John R. Rayne, B. C. Craft, and Murray F. Hawkins, Jr. *Journal of Petroleum Technology*, v. 8; *American Institute of Mining and Metallurgical Engineers, Transactions*, v. 207, Nov. 1956, p. 246-251.

Studies on a five-well system indicate the Frasch process results in improved economics regarding recovery, recovery rate, thermal efficiency, and well spacing.

2381 The Use of Barium Hydroxide in Drilling Muds. H. C. H. Darley and R. A. Generes. *Journal of Petroleum Technology*, v. 8; *American Institute of Mining and Metallurgical Engineers, Transactions*, v. 207, Nov. 1956, p. 252-255.

Barium muds had the same or better toleration of high solids content, resistance to salt contamination, and low gel strengths as the corresponding lime muds.

2382 Airborne Magnetometer Profile From Olympia, Wash., to Laramie, Wyo. W. B. Agocs and R. R. Hartman. *Mining Engineering*, v. 8; *American Institute of Mining and Metallurgical Engineers, Transactions*, v. 205, Dec. 1956, p. 1210-1215.

The 1000-mile magnetic profile yielded numerous general magnetic correlations with broad geologic structures, in particular, the positive deviations on the flanks of basin areas and the negative deviations over mountain areas, and with local structures and depth to igneous rocks.

2383 Quantitative Log Analysis. II. Resistivity of Fluids. R. G. Hamilton and Paul Charrin. *Oil and Gas Journal*, v. 54, Dec. 3, 1956, p. 99-101.

Factors affecting drilling mud and water resistivities.

2384 Petrographical Investigations of the Salt Wash Sediments. J. C. Griffiths, J. A. Cochran, J. J. Hutta, and R. Steinmetz. *Pennsylvania State University, College of Mineral Industries (U. S. Atomic Energy Commission)*, RME-3122, pts. 1-2, 84 p. Sept. 1956. (TN21 Un3.1r Contin.)

Mineral composition and packing characteristics of ore-bearing and barren sandstones. Size, shape, and orientation of quartz grains.

2385 Radio Echoes From the Moon. I. C. Browne, J. E. Evans, J. K. Hargreaves, and W. A. S. Murray. *Physical Society, Proceedings*, v. 69, no. 441B, Sept. 1956, p. 901-920.

Work carried out at a frequency of 120 Mc. per sec. with the moon in transit. Mean echo intensity is compared with theoretical estimates, and nature of rapid fading is investigated in relation to various laws of scattering from moon's surface.

2386* (German.) Types of Asia Minor Lime and Kaolin Deposits. **Typen kleinasiatischer Ton und Kaolinvorkommen.** H. G. Bachmann. *Radex Rundschau*, 1956, no. 7, Oct. 1956, p. 334-348.

Turkish clay and kaolin deposits with special reference to genetic conditions and clay mineral content.

2387* (German.) Water Vapor Condensation on Natural Aerosols at a Slight Oversaturation. **Die Wasserdampfkondensation an natürlichem Aerosol bei geringen Übersättigungen.** Walter Wieland. *Zeitschrift für Angewandte Mathematik und Physik*, v. 7, no. 5, Sept. 1956, p. 428-460.

Studies of cloud-formation mechanisms.

GRAPHIC ARTS

2388 The Mechanism of Dye Formation of Color Photography. II. Salt Effects on Deamination Rate of Oxidized *p*-Phenylenediamines. L. K. J. Tong and M. Carolyn Glesmann. *American Chemical Society, Journal*, v. 78, Nov. 20, 1956, p. 5827-5829.

The most probable ionic forms of the quinonediimine were derived from the results.

2389* Ink for Gravure Printing. II. Reducing Solvents. *American Pressman*, v. 66, Nov. 1956, p. 36-40.

Physical constants of commonly used gravure solvents; variables influencing ink coverage and cost.

2390* Graininess in Offset Reproduction. II. The Measurement of Graininess and Granularity. George W. Jorgensen. *American Pressman*, v. 66, Nov. 1956, p. 41-44.

2391* 3-Color Printing. VII. Screens. Stanley Goldsmith. *American Printer and Lithographer*, v. 137, Nov. 1956, p. 44-45, 50.

Three screen holder; single screen; vacuum pump.

2392* Study of Reproduction Quality. D. L. Goffredo. *ANPA Research Institute, Technical Report No.* 25, Nov. 1956, 10 p.

Steps preparatory to etching halftone plates. Relationship between amount of light exposure and microdensity of negative is illustrated.

2393* The Analysis & Control of Noise in Litho Plate Graining. J. H. Everest. *British Printer*, v. 69, Nov. 1956, p. 30-37.

2394* Electrical Equipment for a Large Printing Machine. P. Wolfensberger. *Brown Boveri Review*, v. 43, no. 8, Aug. 1956, p. 296-300.

Machine can print 250,000 sixteen-page newspapers per hr.

2395 Evaluation of an Image Converter as a High-Speed Camera Shutter. David R. Margetts and Allen E. Wolfe. *California Institute of Technology, Jet Propulsion Laboratory, Memorandum No.* 20-131, June 1956, 24 p. (TL501 C12m Contin.)

Operational tests performed on a high-speed motion picture camera employing a drum camera and an image-converter tube were not successful.

2396* Investigate the Small Offset. James S. Wilkinson. *Canadian Printer and Publisher*, v. 65, Nov. 1956, p. 48 + 4 pages.

Advantages of small lithographic equipment. Types available.

2397* Offset Blankets. Manufacture, Care and Use. R. R. Lewis. *Graphic Arts Monthly*, v. 28, Nov. 1956, p. 66, 68, 70, 72.

2398* (Italian.) The Return of Electrostatics. **Ritorno dell'elettrostatica.** Lewis E. Walkup. *Illustrazione Scientifica*, v. 8, no. 84, Nov. 1956, p. 23-25.

After reviewing historical developments in knowledge of static electricity, the author examines its application in relation to microscopic particles, such as air purification, spray print, a dry paper coating process xerography, and the various safe ways to eliminate undesirable phenomena in industry. Electrostatics in nature is also considered.

2399 Causes of Paper Pick—How to Measure It. Carolyn E. Moore. *Inland Printer*, v. 138, Nov. 1956, p. 52-53, 75.

Why and when paper picks; effects of temperature-humidity; problems with solid areas.

2400 Progress in Photography, 1951-1954. D. A. Spencer, editor. v. II. 336 p. Focal Press, New York. (TR15 P94 Vis.)

Developments in equipment, theory, materials, color photography, processing, cinematography, special techniques and applications, radiography and diffraction, photographic business, industry organizations, and standards.

2401 A "Densitimer" for the Darkroom. W. F. Gephart. *Radio & Television News*, v. 56, Dec. 1956, p. 49-51, 134.

Details on a home-built exposure meter for an enlarger, an enlarger timer, and control-switching unit for photographic printers or enlargers, all housed in a compact enclosure.

See also: **2155** (control of multicolor printing press).

HEAT POWER

2402 Dynamic Stability of Rocket Powerplants Using Liquid Propellants. Rudolf H. Reichel. *Aero Digest*, v. 73, Nov. 1956, p. 20 + 6 pages.

The treatment of powerplant stability from the practical viewpoint of design and control mechanisms.

2403 Some Aspects of Turbojet Performance Calculation at High Flight Mach Numbers. J. R. Palmer. *Aircraft Engineering*, v. 28, Nov. 1956, p. 376-380.

Problems of performance prediction in truly supersonic engines.

2404* A Diagram of State for Superheated Steam. J. F. Ury. *Applied Scientific Research*, v. 6, sec. A, nos. 2-3, 1956, p. 141-146.

2405 The Thermodynamics of Cooled Turbines. I. The Turbine Stage. II. The Multistage Turbine. W. R. Hawthorne. *ASME, Transactions*, v. 78, Nov. 1956, p. 1765-1786.

Procedure was obtained for calculating the effect of cooling on turbine-stage efficiency by visualizing flow in blade passages as one-dimensional compressible flow in a conical tube with heat transfer and friction.

2406* (German.) Trend Towards Higher Rates of Heat Transfer in High Pressure Boiler Design. **Übergang zu höheren spezifischen Wärmebelastungen im Hochdruckkesselbau.** P. Theuerkorn. *Brennstoff-Wärme-Kraft*, v. 8, no. 11, Nov. 1956, p. 521-524.

Cost of austenitic materials demands minimal surface areas.

2407* (German.) Problems of Application, Operation and Construction of Gas Turbines. **Probleme der Anwendung, des Betriebs und der Fertigung von Gasturbinen.** W. Opitz. *Brennstoff-Wärme-Kraft*, v. 8, no. 11, Nov. 1956, p. 542-543.

2408* Choice of Design for an Advanced Turbojet. F. H. Keast. *Canadian Aeronautical Journal*, v. 2, no. 9, Nov. 1956, p. 322-328.

Factors considered are design pressure ratio, turbine temperature and size, with an attempt to assess the effect of these design variables on engine weight and frontal area.

2409* (French.) Present State of the Technique in Gas Turbines and Compressors. **Etat actuel de la technique des turbines à gaz et des compresseurs.** W. Karrer. *Centre de Documentation Sidérurgique, Circulaire d'Informations Techniques*, v. 13, no. 10, 1956, p. 2009-2030.

Study of the various circuits of a gas turbine, of a compressor with radial or axial action, and other parts of a gas turbine plant. Comparison with classical plants and applications.

2410 Steam Power Plant Trends and Their Effect on the Boiler Feed Pump. II. I. J. Karassik. *Combustion*, v. 28, Nov. 1956, p. 51-56.

Changes in boiler feed pump design and application; effect of these changes on the power plant itself.

2411* How to Service Heat Exchangers. *Diesel Power*, v. 34, Nov. 1956, p. 46-50.

Methods for determining heat exchanger troubles; how to clean, repair, and test heat exchangers; how to choose and use the proper cleaners.

2412 Transistorized Indicator Measures Jet Exhaust. George H. Cole. *Electronics*, v. 29, Dec. 1956, p. 143-145.

Thermocouple bridge at jet-engine exhaust feeds temperature-indicating system, including chopper, reference source, and a.c. amplifier, mounted directly behind 2-in. indicator dial on instrument panel.

2413 Heat Power Fundamentals. Carroll M. Leonard and Vladimir L. Maleev. 2nd Rev. Ed. 527 p. 1956. Pitman Publishing Corp., New York. (TJ255 L55h2)

A text for beginning students. Steam engines and turbines, heat transfer and removal, water conditioning, boilers, furnaces, fuels, power plants, and mechanical refrigeration are covered.

2414* (Italian.) Ram-Jet Engines and Rocket Engines. **Statoreattori e motori a razzo.** Salvatore Caldara. *Illustrazione Scientifica*, v. 8, no. 84, Nov. 1956, p. 8-13.

A study of ram jet and rocket engines shows that aeronautical engineering evolves towards the construction of wingless flying devices.

2415 A Solid-Liquid Rocket Propellant System. George E. Moore and Kurt Berman. *Jet Propulsion*, v. 26, Nov. 1956, p. 965-968.

A self-igniting hybrid rocket propellant system employing 90% H_2O_2 as the oxidizer and polyethylene as the fuel.

2416 One-Dimensional Inviscid Flow Through a Rocket Nozzle. R. P. Rastogi and T. P. Pandya. *Journal of Chemical Physics*, v. 25, Nov. 1956, p. 1009-1012.

Computation of exhaust velocity, temperature as a function of nozzle diameter, and cooling rate.

2417* (French.) Present Metallurgical Problems in the Field of Refractory Steels. **Problèmes métallurgiques actuels dans le domaine des aciers réfractaires.** W. Siegfried. *Métaux, Corrosion-Industries*, v. 31, no. 374, Oct. 1956, p. 418-431.

Qualities required in materials used in gas turbine construction. Progress made in various test techniques and in refractory steel production.

2418 Solar Power for Spacecraft. Krafft A. Ehricke. *Missiles and Rockets*, v. 1, Nov. 1956, p. 44-46.

Investigates aspects of space operations by H in high-specific impulse solar power drives.

2419 (English and French.) **Selected Combustion Problems. II. Transport Phenomena; Ignition; Altitude Behaviour and Scaling of Aeroengines.** 495 p. 1956. Butterworths Scientific Publications, London. (QD516 N81s)

These 18 papers deal with aircraft engines and fuels, ignition and flammability, transport properties, high altitude combustion problems, and similarity, scaling, and fundamental parameters in combustion.

2420* (Czech.) Materials for Steam Generators and Turbines Operating at High Temperatures and Pressures. **Materiály pro turbiny a kotle na vysoké tlaky a teploty.** J. Pluhař. *Strojírenství*, v. 6, no. 10, Oct. 1956, p. 677-683.

Optimum utilization of low alloy steels, properties of new steels, and problems of welding austenitic steel.

2421 Technology of Heat. H. Wright Baker. 427 p. 1956. Longmans, Green and Co., New York. (TJ260 B17t)

Fuels and combustion; theory of air compressors and motors; steam engines and turbines; internal-combustion engines; gas turbine; refrigerators and heat pumps; heat transference by radiation, conduction, and convection.

2422 Performance Characteristics of Ring-Cascade-Type Thrust Reversers. Jack G. McArdle. *U. S. National Advisory Committee for Aeronautics, Technical Note* 3838, Nov. 1956, 53 p. (TL570 Un3t)

2423* Automatic Control of Industrial Coal-Fired Boilers. Leo Walter. *Utilization*, v. 10, Nov. 1956, p. 31-33.

Centralized instrument panels located away from the plant handle automatic indication, registration, and adjustment of modern boiler and combustion controls.

See also: **1729** (compression induction systems); **1737** (jet-engine noise reduction); **1747** (flow in ram jets); **2337** (jet mixing with heat release); **2471** (boiler feed pumps).

INFORMATION—PREPARATION AND DISSEMINATION

2424 The Layout of Technical Reports. A. H. Holloway. *North Atlantic Treaty Organization, Advisory Group for Aeronautical Research and Development Specification* 1, Aug. 1956, 20 p. (TL671.1 Ag11s Contin.)

Recommendations for size, markings on cover and title page, contents list, pagination, notation, abstract, list of references, tables, illustrations, appendices, and index cards.

2425* (Spanish.) Technical Documentation and International Cooperation. Application to Metal Joining. **Documentación técnica y cooperación internacional, su aspecto en el dominio de la soldadura.** Lise Blosset. *Tecnica Metalurgica*, v. 12, no. 105, May-June 1956, p. 82-92.

The various factors of documentation were studied and applied to the organization of information in a definite industry. Improvements of methods in the welding field. Other special techniques.

See also: **2190** (bibliography on insulated conductors).

INSTRUMENTATION

2426* Planned Automation Results in Special Automatic Sorter. L. V. Wise. *Automation*, v. 3, Dec. 1956, p. 67-71.

The new equipment measures and sorts crystal blanks according to orientation of cut at a rate of 43 blanks per min. and with an accuracy of 20 sec. of arc; about 10 times faster and 5 times more accurately than a skilled operator.

2427 Quality Measurements by Flame Photometer. J. K. Rice. *Combustion*, v. 28, Nov. 1956, p. 57-61.

Development of Na tracer technique coupled with use of flame photometry for sensitive detection of Na offers accurate means of measuring steam purity under varying conditions of boiler operation.

2428* Refractometry of Tissue Sections by Phase-Contrast Microscopy. N. M. Hancox and J. Kruszynski. *Experimental Cell Research*, v. 11, Aug. 1956, p. 327-339.

2429 The 1957 I&A Handbook & Buyers' Guide. *Instruments and Automation*, v. 29, pt. 2, Oct. 1956, 296 p.

Index to instruments and apparatus. Directory of manufacturers and representatives, with addresses and brief descriptions. Handbook data on temperature and pressure.

2430 Inductance-Type Thermocouple Tester. Peter R. Morris. *Instruments and Automation*, v. 29, Nov. 1956, p. 2217-2219.

Development of a portable battery-operated instrument capable of detecting a short-circuit 4-in. or more from the hot junction of a 5-ft. long thermocouple.

2431 Suction Pyrometers in Theory and Practice. T. Land and R. Barber. *Iron and Steel Institute, Journal*, v. 184, Nov. 1956, p. 269-273.

Rigorous methods for estimating the error of an instrument in use. A pyrometer designed on the basis of theoretical and experimental work.

2432 Experimental Studies on the Light-Scattering Method and Its Calibration. W. J. Hughes, P. Johnson, and R. H. Ottewill. *Journal of Colloid Science*, v. 11, Aug.-Oct. 1956, p. 340-351.

Systematic attempt to explain discrepancy between results obtained from aqueous and nonaqueous calibrating fluids culminated in design of a new light-scattering instrument employing parallel incident light.

2433* Recent Tendencies in Pneumatic Metrology. Raoul Molle. *Microtecnic (English Ed.)*, v. 10, no. 4, 1956, p. 167-179.

Principles; designs of apparatus with subsonic and with sonic flows; self-control and autocalibrating of machines.

2434* A New Snap Gauge. E. Pelé. *Microtecnic (English Ed.)*, v. 10, no. 4, 1956, p. 197-200.

Technical and economical points of view; various types of adjustable gages; snap gage with interchangeable slip gages.

2435 New Pendulum Impact Tester. Karl W. Ninnemann. *Modern Packaging*, v. 30, Nov. 1956, p. 163 + 6 pages.

Instrument design; calibration; experimental results.

2436 A Simple-Wide Range Gamma Dose-Rate Meter. K. E. G. Perry and C. C. H. Washtell. *Nuclear Power*, v. 1, May 1956, p. 17-19, 28.

The circuit employs an electrometer pentode as the logarithmic element in a d.c. amplifier to measure the current in an ionization chamber.

2437 Correcting Anthracene Dosimeter Readings for Neutron Response. K. R. Spearman, Jr. *Nucleonics*, v. 14, Nov. 1956, p. 84-86.

2438 Metallic Muffle for High-Temperature Sintering. Edmund N. Mazza. *Precision Metal Molding*, v. 14, Dec. 1956, p. 44-45.

Inconel can be successfully and economically used for applications where the maximum temperature does not exceed 1350 C.

2439 Electrolytic Tank, Design and Applications. Phyllis A. Kennedy and Gordon Kent. *Review of Scientific Instruments*, v. 27, Nov. 1956, p. 916-927.

Theory of the electrolytic tank analog as a device for the solution of potential problems. Mechanical requirements of design. Experimental accuracy in tank measurements.

2440 Apparatus for the Production of Large Water Drops. R. H. Magarvey and B. W. Taylor. *Review of Scientific Instruments*, v. 27, Nov. 1956, p. 944-947.

2441 Modified Adiabatic Calorimeter. M. W. Belaga, D. M. Coddington, and H. Marcus. *Review of Scientific Instruments*, v. 27, Nov. 1956, p. 948-951.

A fixed rate of power is supplied to the sample, and a bath which surrounds the sample container is maintained at the same temperature in order to prevent heat losses. Heat capacity of an unknown material may be calculated from measurements of the time rate of temperature rise, heat input, and mass of the sample.

2442 Simple 60-cps Hysteresis Loop Tracer for Magnetic Materials of High or Low Permeability. D. H. Howling. *Review of Scientific Instruments*, v. 27, Nov. 1956, p. 952-956.

2443 Controlled Capillary Gas Leak. R. K. Smither. *Review of Scientific Instruments*, v. 27, Nov. 1956, p. 964-965.

Relatively simple adjustable capillary leak contains no moving parts and can be controlled from a distance. Gas flow is controlled by regulating the temperature of the gas in the capillary.

2444 A Precise Automatic Manometer Reader. J. Farquharson and H. A. Kermicle. *Union Carbide Nuclear Company (U. S. Atomic Energy Commission)*, K-1282, Nov. 1956, 8 p. (UF767 Un3.1K Contin.)

Instrument consists of an optical sighting device mounted on a precision elevating mechanism, an electronic servo-system, and a digital register.

2445 A Remote Controlled Quartz-Fiber Microbalance. Fabrication of Quartz Components. R. G. Olt, H. R. DuFour, M. I. Gray, and J. H. Wright. *U. S. Atomic Energy Commission, Research and Development Report*, MLM-1023, Dec. 1954, 41 p. (UF767 Un3.1m Contin.)

A balance for the weighing of microgram quantities of radioactive isotopes, toxic materials, or substances which must be maintained in controlled atmospheres.

2446 Methods for Measuring Temperatures of Thin-Walled Gas-Turbine Blades. Francis S. Stepka and Robert O. Hickel. *U. S. National Advisory Committee for Aeronautics, Research Memorandum* E56G17, Nov. 1956, 25 p. (TL782 Un3rm Vis.)

Investigations were conducted at maximum rated engine conditions, a turbine-inlet gas temperature of about 1650 F, and an engine speed of 11,500 r.p.m.

2447* (German.) Factors Determining Ultimate Vacuum in Vacuum Equipment Provided With Oil-Diffusion Pump. **Über Faktoren, die das Endvakuum in mit Öldiffusionspumpen ausgestatteten Vakuumanlagen bestimmen.** R. Haefer and O. Winkler. *Vakuum-Technik*, v. 5, no. 7, Oct. 1956, p. 149-155.

Pressure-time course of various gasket materials. Gas-emission of rubber and effect of temperature. Vapor pressure curves of various oils.

2448* (Russian.) Apparatus for Calibrating Tungsten-Molybdenum Thermocouples. **Ustanovka dlia graduirovki vol'frammolibdenovykh termopar.** S. K. Danishevskii. *Zavodskaia Laboratoriia*, v. 22, no. 10, Oct. 1956, p. 1235-1240.

Components of the apparatus and its accuracy.

2449* (Russian.) Dilatometer for the Study of Phase Transformations in Alloys. **Dilatometr dlia issledovaniia fazovykh prevrashchenii v splavakh.** V. G. Permiakov and M. V. Belous. *Zavodskaia Laboratoriia*, v. 22, no. 10, Oct. 1956, p. 1251-1252.

Design, operation, and degree of accuracy of device for laboratory determinations of coefficients of linear expansion and phase transformations.

2450* (German.) Mixing Calorimeter for Measurement of Metallic Mixed Phase Enthalpies Between 25 and 1000 C. **Ein Mischungskalorimeter zur Messung der Enthalpie metallischer Mischphasen zwischen 25 und 1000.** Franz Eberhard Wittig and Georg Böhm. *Zeitschrift für Metallkunde*, v. 47, no. 10, Oct. 1956, p. 699-704.

A calorimeter which automatically drops the specimens into the bath.

See also: **1730** (humidity-measuring equipment); **2126** (recording viscometer); **2230** (acidity control meter); **2556** (corrosion in water meter); **2686** (solar furnace).

LUBRICATION AND FRICTION

2451 Composition of Lubricating Oil. Use of Newer Separation and Spectroscopic Methods. F. W. Melpolder, R. A. Brown, T. A. Washall, William Doherty, and C. E. Headington. *Analytical Chemistry*, v. 28, Dec. 1956, p. 1936-1945.

Composition and physical properties of fractions separated from a solvent-refined oil heart cut.

2452* (Dutch.) Lubrication and Lubricants. **Smering en smeermiddelen.** *Bedrijf en Techniek*, v. 11, no. 265, Nov. 3, 1956, p. 686-690.

The production and properties of lubricants, their use in modern industry, and problems concerning fatty substances.

2453 The Influence of Temperature on Petroleum Lubricating Grease. H. W. Winkler. *Blast Furnace and Steel Plant*, v. 44, Nov. 1956, p. 1287-1290.

2454* (German.) Lubricating Oil Film Resistance in Friction Bearing and Its Relation to Load and R.P.M. **Untersuchungen über die Filmresistenz von Schmierölen im Gleitlager in Abhängigkeit von Belastung und Umdrehungszahl. II.** Investigation of Errors Evaluation. **Versuchsdurchführung und Fehlerabschätzung.** Ernst Terres, Günter Morlock, and Karl Hans Volker. *Erdöl und Kohle*, v. 9, no. 10, Oct. 1956, p. 690-693.

2455 Load Capacity and Dry Friction Tests of a Water-Lubricated Thrust Bearing. Stanley Abramovitz. *Franklin Institute Laboratories for Research and Development, Final Report No.* AECU-3150, Feb. 19, 1954 to Aug. 31, 1954, 21 p. (UF767 U3au Contin.)

Load capacity tests indicated ability to maintain full fluid film under 100 psi. unit load when proper shoe-face curvature was imposed. Dry friction tests resulted in no harmful bearing-surface effects during 5-min. period.

2456 Hydroxyarylstearic Acids as Oxidation and Rust Inhibitors in Lubricants. Henry Gisser, Joseph Messina, and Jonathan Snead. *Industrial and Engineering Chemistry*, v. 48, Nov. 1956, p. 2001-2004.

Preparation of additives; H_2SO_4, BF_3, and $AlCl_3$ procedures; evaluation of inhibitor activity.

2457 Hydrodynamic Lubrication and Its Application to Bearing Design. F. T. Barwell. *Institute of Petroleum, Journal*, v. 42, Nov. 1956, p. 304-315.

2458 Lubricant Additives and Their Action. C. V. Smalheer and T. W. Mastin. *Institute of Petroleum, Journal*, v. 42, Nov. 1956, p. 337-347.

The commercial development of hypoid gear lubricants and heavy-duty detergent oils in the U. S. A., with particular reference to the role of full-scale test procedures.

2459 Solid Film Lubricants. Ralph E. Crump. *Instruments and Automation*, v. 29, Nov. 1956, p. 2232-2236.

Application, technique, surface pretreatment, operational factors, and theoretical considerations.

2460 Fatigue of Plain Bearings. W. E. Duckworth and G. H. Walter. Paper from "International Conference on Fatigue of Metals". v. III. Institution of Mechanical Engineers. 10 p. + 2 plates. (TA460 In8p Over.)

Mechanism of fatigue; determination of fatigue strength; factors influencing fatigue strength; relation between thickness and strength of linings; stress analysis; influence of backing materials.

2461 Statistical Investigation of the Fatigue Life of Deep-Groove Ball Bearings. J. Lieblein and M. Zelen. *Journal of Research, National Bureau of Standards*, v. 57, Nov. 1956, p. 273-316.

Test data from several large manufacturers are analyzed.

2462 Ball Bearings for High Speeds. Heinz Hanau. *Machine Design*, v. 28, Nov. 15, 1956, p. 88-106.

Factors influencing design and application of special bearings for high speeds and high temperatures; basic bearing geometry, separator design and materials, special bearing configurations, bearing materials, lubrication, mounting fits and clearances, and causes of bearing failure.

2463* A New High Performance Grease Mixer. O. L. Yarham and P. R. Sigler. *Spokesman*, v. 20, Nov. 1956, p. 14 + 5 pages.

Experimental pilot unit; radial propeller agitator; typical pilot plant grease processing; full scale equipment; continuous grease manufacture.

2464* Spray Lubrication Improves Productivity, Cuts Costs. Eric H. Cocks. *Tool Engineer*, v. 37, Dec. 1956, p. 81-84.

Advantages of spray lubrication include exact control over the amount of fluid applied, speed of application, and adaptability to automation.

See also: **2712** (scoring properties of metals); **3112** (theory of surface friction).

MECHANICAL ENGINEERING

2465 Thermo-Elastic Formulae for the Analysis of Beams. W. S. Hemp. *Aircraft Engineering*, v. 28, Nov. 1956, p. 374-376.

Stress distributions within a structure due to temperature gradients and their influence on strength and stiffness.

2466* Thermal Stresses in a Plate Containing Two Circular Holes of Equal Radius, the Boundaries of Which Are Kept at Different Temperatures. C. A. M. Van Der Linden. *Applied Scientific Research*, v. 6, sec. A, nos. 2-3, 1956, p. 117-128.

Mathematical analysis.

2467* Elasticity and Plasticity. F. A. Vening Meinesz. *Applied Scientific Research*, v. 6, sec. A, nos. 2-3, 1956, p. 205-225.

A graphical representation of the state of stress gives a simple way of comparing the different states of stress corresponding to the yield-limit.

2468 Closed Systems for Testing Compressors. R. M. Johnson. *ASME, Transactions*, v. 78, Nov. 1956, p. 1677-1682.

Requirements for the design and operation of test systems to use various gases. Instrumentation and procedures necessary to meet ASME Power Test Code standards of accuracy.

2469 The Design of Axial Flow Pumps. R. D. Bowerman. *ASME, Transactions*, v. 78, Nov. 1956, p. 1723-1734.

An analysis of optimizing the impeller geometric parameters for cavitation conditions is presented to permit the initial choices of the quantities appearing in the design procedure.

2470 Bitumen in Hydraulic Engineering. Baron W. F. Van Asbeck. 154 p. 1955. Shell Petroleum Co., London. (TC153 As15b)

Bituminous products; principles of hydraulic application; examples of use in sea walls, river dikes, canals, reservoirs, and breakwaters.

2471* (German.) Boiler Feed Pumps and Recirculating Pumps for High Pressures and Temperatures. **Kesselspeisepumpen und Umwälzpumpen für hohe Drücke und Temperaturen.** Ernst Honold. *Brennstoff-Wärme-Kraft*, v. 8, no. 11, Nov. 1956, p. 528-530.

Supercritical steam conditions in power stations require final pressures of 6,000 lb. per sq. in. Two new pumps are described.

2472* Pumping Liquids Without a Pump. Leo Walter. *Chemical & Process Engineering*, v. 37, Nov. 1956, p. 392-394.

Principle of operation; air pumps with closed float; pump with air-operated ejector; handling corrosive liquids.

2473 The Design and Construction of Engineering Foundations. F. D. C. Henry. Civil Engineering Series. 547 p. 1956. McGraw-Hill, New York. (TA775 H39d)

Research on scour at bridge piers, activity of clay, consolidation settlement in practice, bearing capacity of soils, lateral pressure on concrete on form-work, effect of settlement on superstructures, and Richart's work on pad footings.

2474 (German.) Design of Mechanically Driven Dam-Installations. **Die Konstruktive durchbildung von wehranlagen mit Mechanischem Antrieb.** F. W. Peilert. 237 p. 1955. VEB Verlag Technik, Berlin. (TC553 P35k)

Handbook for the construction of canal locks and their auxiliary equipment.

2475 Propeller Fan Orifice Design. Anwar A. Atalla. *Electrical Manufacturing*, v. 58, Dec. 1956, p. 100-104.

Design is critical for efficient propeller performance.

2476* A. C. and D. C. Conduction Pumps for Liquid Metals. L. R. Blake. *Engineer*, v. 202, Oct. 26, 1956, p. 572-576.

Chief design features of the d. c. conduction pump and the mains-frequency and L. F. a. c. conduction pump, including types with combined low-voltage transformer.

2477 Rational Design of Stayed Tube-Plates. II. J. P. Duncan. *Engineering*, v. 182, Oct. 26, 1956, p. 525-528.

Discusses the condition of a circular plate, rigidly held at the periphery, but where the stays are eccentrically disposed. Presents theoretical method by which the loads induced in individual stays of symmetrically stayed tube-plates can be calculated.

2478 End Reactions and Stresses in Pipe-Lines. L. F. Randolph. *Engineering*, v. 182, Nov. 2, 1956, p. 555-557.

Specimen calculations for two and three dimensional layouts.

2479 A Handbook on Belt Conveyor Design. 148 p. 1956. General Electric Co., Kent, England. (TJ1390 G28h)

Details on belts, troughing and return idlers; head, tail and bend pulleys; drives, supporting structures, chutes; takeups; belt cleaners; and holdbacks.

2480 Control Valves. XI. Valve Sizing. C. S. Beard. *Instruments and Automation*, v. 29, Nov. 1956, p. 2220-2223.

Basic factors in valve sizing include max. and min. flows to be controlled, max. and min. pressure-differentials across valve, specific gravity, temperature, viscosity, flashing, and rangeability.

2481 Allowance for Stress Concentration in Design to Prevent Fatigue. Horace J. Grover. Paper from "International Conference on Fatigue of Metals". v. I. Institution of Mechanical Engineers. 9 p. (TA460 In8p Over.)

Evidence for effective stress-concentration factors was derived from laboratory tests on specimens with simple geometrical discontinuities under various load conditions.

2482 Distribution Functions for the Prediction of Fatigue Life and Fatigue Strength. A. M. Freudenthal and E. J. Gumbel. Paper from "International Conference on Fatigue of Metals". v. I. Institution of Mechanical Engineers. 12 p. (TA460 In8p Over.)

Fatigue theories and scatter of fatigue strength and life; boundary conditions; distribution of fatigue life at constant stress amplitude and fatigue strength at constant number of cycles; fatigue life vs. fatigue strength relations.

2483 The Effect of Mean Stress on the Push-Pull Fatigue Properties of an Alloy Steel. H. C. O'Connor and J. L. M. Morrison. Paper from "International Conference on Fatigue of Metals". v. I. Institution of Mechanical Engineers. 10 p. (TA460 In8p Over.)

The limiting safe range of stress was investigated for mean stresses varying from 30 tons per sq. in. compression to 37½ tons per sq. in. tension. There is a linear relation between the safe range of stress and the mean stress for all ranges of stress in which the lower static yield is not exceeded.

2484 Effect of Variable Load and Cumulative Damage on Fatigue in Vehicle and Airplane Structures: The Fatigue Strength of Vehicle and Aircraft Components. E. Gassner. Paper from "International Conference on Fatigue of Metals". v. I. Institution of Mechanical Engineers. 8 p. (TA460 In8p Over.)

Results of practical-vehicle-running and laboratory-program tests are compared.

2485 The Fatigue Testing of Components. A Means of Revealing the Danger Point in Pieces or Structures. H. de Leiris. Paper from "International Conference on Fatigue of Metals". v. I. Institution of Mechanical Engineers. 6 p. + 4 plates. (TA460 In8p Over.)

Three examples illustrate effectiveness of method under varied conditions.

2486 The Influence of Fillet Radius on the Fatigue Strengths of Large Steel Shafts. S. F. Dorey and G. P. Smedley. Paper from "International Conference on Fatigue of Metals". v. I. Institution of Mechanical Engineers. 12 p. + 2 plates. (TA460 In8p Over.)

Results of full-scale torsional fatigue tests.

2487 Interpretation of Fatigue Strengths for Combined Stresses. Joseph Marin. Paper from "International Conference on Fatigue of Metals". v. I. Institution of Mechanical Engineers. 13 p. (TA460 In8p Over.)

Development of theory for predicting fatigue strength of materials under combined states of stress. Comparisons with test data.

2488 A Method of Estimating the Fatigue Strength of Small Ellipsoidal Cavities. R. E. Peterson. Paper from "International Conference on Fatigue of Metals". v. I. Institution of Mechanical Engineers. 10 p. (TA460 In8p Over.)

Mathematical analysis for prolate and oblate ellipsoids and inclusions; application to rotor problems.

2489 Theory for Combined Bending and Torsion Fatigue With Data for SAE 4340 Steel. W. N. Findley, J. J. Coleman, and B. C. Hanley. Paper from "International Conference on Fatigue of Metals". v. I. Institution of Mechanical Engineers. 10 p. (TA460 In8p Over.)

Mathematical formulation of the effect of a normal stress acting on the critical shear plane. Comparisons with experimental data.

2490 Usefulness and Role of Repeated Strain Testing as an Aid to Engineering Design and Practice. R. W. Bailey. Paper from "International Conference on Fatigue of Metals". v. I. Institution of Mechanical Engineers. 7 p. (TA460 In8p Over.)

Typical cases illustrating value in design and material selection.

2491 Fatigue in Automobiles. R. J. Love. Paper from "International Conference on Fatigue of Metals". v. III. Institution of Mechanical Engineers. 13 p. + 2 plates. (TA460 In8p Over.)

Fatigue investigations on gears, crankshafts, and splines for axles. Accelerated testing of complete vehicles.

2492 Lessons to be Learnt From Failures in Service. G. A. Cottell. Paper from "International Conference on Fatigue of Metals". v. III. Institution of Mechanical Engineers. 9 p. + 4 plates. (TA460 In8p Over.)

Causes, recognition, and prevention of corrosion-fatigue and dry-fatigue.

2493 Positive-Type Rotary Compressors. V. Barnett. *Iron and Steel Institute, Journal*, v. 184, Nov. 1956, p. 316-331.

Details of machines representative of present day practice; technical data include efficiencies and limitations of pressure and outputs.

2494 On the Problem of Uniqueness in the Theory of a Rigid-Plastic Solid. II. R. Hill. *Journal of the Mechanics and Physics of Solids*, v. 5, Nov. 1956, p. 1-8.

Uniqueness and extremum principles are illustrated in relation to the torsion of a bar of hollow section.

2495 Analyzing Effect of Bending Loads on Bolted Flange Joints. B. B. Clements. *Machine Design*, v. 28, Nov. 15, 1956, p. 119-122.

A quick and simple method for analysis of circular and semicircular bolted joints subject to both pressure and bending loads.

2496 Design Guide. Translating Screw Threads. Robert V. MacKenzie. *Machine Design*, v. 28, Nov. 29, 1956, p. 106-113.

A basic guide to selection and application of screw thread forms developed for transmission of motion and power.

2497 Design Charts and Equations for Controlled Epicyclic Gear Systems. H. G. Laughlin, A. R. Holowenko, and A. S. Hall. *Machine Design*, v. 28, Nov. 29, 1956, p. 129-138.

2498 Errors in Angular Position, Velocity, and Acceleration of Gears Due to Eccentricity. S. D. Ayres. *Machinery*, v. 89, Nov. 1956, p. 1008-1013.

An analysis of eccentricity effects. Derivation of formula which can be applied to any gear train of known parameters, to enable its suitability for a given purpose to be assessed.

2499* Stresses in the Neighborhood of Discontinuities. W. Muckle. *North East Coast Institution of Engineers & Shipbuilders, Transactions*, v. 73, Nov. 1956, p. 29-35.

Method for examining stress distribution in a plate is based on the analogy which exists between the equation of equilibrium for a plate which is deflected in a direction perpendicular to its surface and the expression for the stress function, where the plate is stressed in its own plane.

2500 Reciprocating Compressor Special Report. I. Introduction to Principles. II. Mechanical Design. III. Performance Characteristics. IV. Installation, Operation and Maintenance. V. Compressor Trouble-Shooting. *Petroleum Refiner*, v. 35, Nov. 1956, p. 120-150.

2501* Mechanical Seals Reduce Pump Operating Costs. Ted J. Sniffen. *Plant*, v. 14, Nov. 1956, p. 42-45.

Explains the basic functions of seal parts applied to stuffing boxes, valves, and other pump parts.

2502* Want Accurate, Reliable Controlled-Volume Pumps? B. Bertolet. *Power*, v. 100, Dec. 1956, p. 126-129, 198, 200.

Suggestions for construction, installation, and maintenance.

2503 Proceedings of the Society for Experimental Stress Analysis. C. V. Mahlmann and W. M. Murray, editors. v. XIV. No. 1. 214 p. 1956. Society for Experimental Stress Analysis, Cambridge, Mass. (TG265 So13p Vis.)

Pertinent papers are abstracted individually.

2504 A Three-Dimensional Photoelastic Study of Contact Stresses in the Head of a Model of a Railroad Rail. M. M. Frocht. Paper from "Proceedings of the Society for Experimental Stress Analysis". v. XIV. No. 1. p. 1-12. (TG265 So13p Vis.)

Using the shear difference and the stress-freezing processes, principal stresses and maximum shears were determined in the transverse section of the rail under the center of the wheel.

2505 On the Relation Among Stress, Strain, and Strain Rate in Copper Wires Submitted to Longitudinal Impact. C. Riparbelli. Paper from "Proceedings of the Society of Experimental Stress Analysis". v. XIV. No. 1. p. 55-70. (TG265 So13p Vis.)

Data from exploratory tests of tensile impact are used for the interpretation of the mechanism of plastic deformation caused by longitudinal impact.

2506 Stress Concentration Factors for Circular Fillets in Stepped Wall Cylinders Subject to Axial Tension. L. H. N. Lee and C. S. Ades. Paper from "Proceedings of the Society for Experimental Stress Analysis". v. XIV. No. 1. p. 99-108. (TG265 So13p Vis.)

Plastic cylinders were cast, cured, machined, stressed, and sliced; slices were studied photoelastically. Hysol 6020 epoxide resin was found to be very promising.

2507 The Study of the Propagation of Stress Waves by Photoelasticity. J. C. Feder, R. A. Gibbons, J. T. Gilbert, and E. L. Offenbacher. Paper from "Proceedings of the Society for Experimental Stress Analysis". v. XIV. No. 1. p. 109-122. (TG265 So13p Vis.)

Wave propagation was followed with a high speed framing camera and initiation of the stress waves by ballistic methods which produce high rates of loading.

2508 An Apparatus for the Determination of Stress-Strain Properties at High Rates of Strain. R. J. MacDonald, R. L. Carlson, and W. T. Lankford. Paper from "Proceedings of the Society for Experimental Stress Analysis". v. XIV. No. 1. p. 163-170. (TG265 So13p. Vis.)

Total strain rates ranging from ¼ to 190 in. per min. were obtained using a 10-ton Denison hydraulic press in conjunction with a specially designed subpress. Stress-strain curves indicate the effects of a range of strain rates and temperatures on the initial yielding behavior of low-carbon steel.

2509 Static and Dynamic Calibration of a Photoelastic Model Material, CR-39. A. B. J. Clark. Paper from "Proceedings of the Society for Experimental Stress Analysis". v. XIV. No. 1. p. 195-204. (TG265 So13p Vis.)

Measurements of strain and birefringence for effective loading times in the range of 10 min. and 10^{-4} sec. Two methods of determining the effective gage factor for wire resistance strain gages used on this resin.

2510* (French.) Particulars for the Calculations of Light Alloy Structures. **Particularités du calcul des structures en alliage léger. II.** Jean Reinhold and Henri Hugonnet. *Revue de l'Aluminium*, v. 33, no. 235, Sept. 1956, p. 841-848.

The critical, local, and general buckling in strained, compressed, bent, and sheared plates were calculated, as well as the resistance to buckling of composite lattice parts and ladder design beams.

2511* (German.) The Present Situation in the Classification of the Welding Processes. **Der gegenwärtige Stand in der Ordnung der Schweissverfahren.** H. v. Neuenkirchen. *Schweissen und Schneiden*, v. 8, no. 10, Oct. 1956, p. 374-378.

Classification of welding processes and their relation to present standards.

2512* (French.) Considerations on Welding as a Factor of Productivity. **Considérations sur le soudage envisagé comme facteur de productivité.** H. Gerbeaux. *Soudage et Techniques Connexes*, v. 10, nos. 9-10, Sept.-Oct. 1956, p. 235-272.

Examples for which welding was indispensable in the production of materials absolutely necessary for some definite working conditions.

2513 Work Handling Between Machine Tools. R. L. Palmer. *Steel Processing*, v. 42, Nov. 1956, p. 631-633.

Types of equipment for work handling; electrical controls required; trouble-shooting aids.

2514* Simplify Tooling for Short-Run Economy. Leonard Mueller. *Tool Engineer*, v. 37, Dec. 1956, p. 91-94.

Examples, selected from typical tooling practices in aircraft and model shop practice, represent methods by which tooling costs can be minimized for short runs.

See also: **1734** (thermal buckling of panels); **1837** (characteristics of structural materials); **2284** (mechanical design of electronic equipment); **2410** (boiler feed pumps); **2763** (effects of stress concentration on fatigue strength).

METALLURGY

2515* (English.) **Galvanised Steel Sheet Roofing.** *Acier, Stahl, Steel*, v. 21, no. 10, Oct. 1956, p. 403-405.

Typical continental applications are illustrated.

2516* (Italian.) Characteristics of a New Light Alloy (Iridal) for Architectural Uses. **Caratteristiche di una nuova lega leggera (Iridal) per architettura.** C. Panseri. *Alluminio*, v. 25, no. 10, Oct. 1956, p. 427-434.

Mechanical and structural characteristics of new heat-treatable alloys containing B.

2517 Special Heat of Austenitic Stainless Steel Used in the Experimental Breeder Reactor (EBR-1). Robert A. Noland and David E. Walker. *Argonne National Laboratory (U. S. Atomic Energy Commission)*, ANL-5548, Oct. 1956, 16 p. (UF767 Un3.1an Contin.)

The basis for specified composition; melting procedure; reactor components employing the material.

2518 Investigation of Some Niobium-Base Alloys. Stan J. Paprocki and John T. Stacy. *Battelle Memorial Institute (U. S. Atomic Energy Commission)*, BMI-1143, Oct. 1956, 16 p. (UF767 U3b Contin.)

Twenty-seven alloys, containing 5 wt.% Al, Cr, Fe, Mo, Ni, Ta, W, V, or Zr and with an addition of 0, 9.5, or 19.0 wt.% Ti, were examined for workability, ductility, hardness at room temperature and 1600 F, and oxidation resistance at 1800 F.

2519 Alloys of Chromium With Platinum, Iridium, Rhodium, and Ruthenium. E. Raub and W. Mahler. *Henry Brutcher Translation No.* 3821, 15 p. (From *Zeitschrift Metallkunde*, v. 46, no. 3, 1955, p. 210-215.) Henry Brutcher, Altadena, Calif.

Previously abstracted from original. See item 9309, v. 4, July 1955.

2520 New Plant for Super-Alloy Production in Canada. G. W. Paget. *Canadian Metals*, v. 19, Nov. 1956, p. 54, 56, 58.

Standard sand molding techniques, shell molding, lost wax process, and Shaw process are used. Stellite facing increases service life of parts produced.

2521* Zinc: Properties and Uses in Modern Industry. *Canadian Mining and Metallurgical Bulletin*, v. 49, no. 535, Nov. 1956, p. 742-754; *Canadian Institute of Mining and Metallurgy, Transactions*, v. 59, 1956, p. 410-422.

A series of 7 papers on die casting, Zn rolling, continuous galvanizing of steel band, Zn grades and specifications, alloys and corrosion, research and development, and general trends and economics.

2522 Titanium Moves Into Process Equipment. G. T. Bedford, W. J. Weeks, and A. G. Caterson. *Chemical Engineering*, v. 63, Dec. 1956, p. 238 + 5 pages.

Economics and availability of Ti; physical and mechanical properties; fabricating; corrosion resistance.

2523 The Range of Steels. J. D. Gilchrist. Paper from "Chemical Engineering Practice". v. II. Academic Press, p. 144-175. (TP155 C42e)

Properties and heat treatment of various types of steel.

2524 Chromium-Nickel Austenitic Steels. F. H. Keating. 138 p. 1956. Butterworths Scientific Publications, London. (TN757.C5 K22c)

A reference book for the practical man, covering the development and metallurgy of these steels, manufacturing and fabricating processes, castings, mechanical and physical properties, corrosion resistance, and chemical analysis.

2525* (French.) Mechanical Heat Resistance of Light Alloys. **Résistance mécanique a chaud des alliages légers.** *Fonderie*, 1956, no. 128, Sept. 1956, p. 367-369.

Bibliographical data on light alloys of various life durations at high temperatures.

2526* (French.) The Use of Stainless Steels Other Than 18/10 in Chemical Engineering. **L'emploi en génie chimique des aciers inoxydables autres que ceux du type 18/10.** J. Hochmann. *Génie Chimique (Supplement to Chimie & Industrie)*, v. 76, no. 4, Oct. 1956, p. 97-105.

Shows the significance of Mo and Cu additions and the advantage of Ni-free ferrite steels and Cr-Ni-Mn steels.

2527* (Polish.) Steel-Aluminum Trolley Wires for Transportation Systems. **Stalowo-aluminiowe jezdne przewody sieci trakcyjnej.** Leszek Godecki. *Hutnik*, v. 23, no. 9, Sept. 1956, p. 340-343.

Replacing Cu trolley wires by cheaper Al-steel wire. The Al acts as the major conductor of the current while steel provides the necessary durability.

2528 Special Metals, Special Equipment, Special Products. *Industrial and Engineering Chemistry*, v. 48, Nov. 1956, p. 1963-1981.

Group of articles showing the interrelation of new development in Ta, stainless steels, Al, Ni, and their alloys; special equipment that can be fabricated as a result; the special products which require this equipment for their manufacture.

2529 Nuclear Irradiation and Radioisotopes in Metal Research. Massoud T. Simnad. *International Journal of Applied Radiation and Isotopes*, v. 1, no. 3, Nov. 1956, p. 145-171.

A comprehensive review of research using nuclear irradiation in detecting minute quantities of impurities or minor constituents and in studying metal structure; also, use of radioisotopes in studies of segregation, friction, vapor deposition, vapor pressure, slag-metal reactions, electrolytic action on metal surfaces, and diffusion and oxidation.

2530 High-Tensile Weldable Steel. Development of a Molybdenum-Chromium-Molybdenum-Vanadium Type for Pressure Vessels. W. Barr and I. M. MacKenzie. *Iron & Steel*, v. 29, Nov. 1956, p. 519-522.

General characteristics; response to heat treatment; notch ductility; weldability.

2531* (Hungarian.) Aluminum of Internationally Accepted Standard Quality. Hungarian Production Results in 1955. **Nemzet-közi elöirásoknak magfelelő alumíniumhuzalok 1955 évi hazai gyártásának tapasztalatai.** András Domony, Róbert Vassel, and János Déry. *Kohászati Lapok*, v. 11, no. 8, Aug. 1956, p. 369-377.

Review of laboratory and industrial experiments for the improvement of the properties of electrically conductive Al wire. Effects of production methods on properties of wire.

2532* (Russian.) Simultaneous Modification and Degasification of Aluminum Alloys. **Odnovremennoe modifitsirovanie i degazatsiia aluminievykh splavov.** A. A. Gorshkov and V. G. Korotkov. *Liteinoe Proizvodstvo*, 1956, no. 10, Oct. 1956, p. 6-9.

Consists of adding low melting chlorides instead of the metals or their alloys.

2533 Titanium Design Notes. *Magnesium*, 1956, Nov. 1956, p. 10-15.

Properties; formability; welding characteristics; corrosion resistance.

2534 Metallurgy in Music Making. H. H. Symonds. *Metal Industry*, v. 89, Oct. 26, 1956, p. 349-351, 358.

History of the development of metal strings for violins and pianos, and the shorter gut strings wound with metal wire; development of suitable alloys; organ pipes. (To be continued.)

2535* (German.) Manufacture and Use of Copper-Plated Steel Telephone Line Wire of High Strength. **Herstellung und Verwendung von Telefon-Freileitungsdrähten hoher Festigkeit aus kupferplattiertem Stahldraht.** *Metall*, v. 10, nos. 21-22, Nov. 1956, p. 1038-1041.

Characteristics and advantages in use of Cu plated steel wires for telephony.

2536 Production of Honeycomb Sandwich Structures. George D. Cremer. *Metal Progress*, v. 70, Nov. 1956, p. 81-84.

Strong lightweight structures can be made by bonding two thin sheets of a strong material to an expanded honeycomb core. Adhesives are used for low-temperature service, brazed or welded joints for high-temperature applications.

2537 New High-Strength Copper Alloy. J. F. Klement and N. A. Birch. *Metal Progress*, v. 70, Nov. 1956, p. 106-109.

New British Al bronze containing 12% Mn has better casting properties and more attractive mechanical properties than the conventional high-strength bronzes.

2538 A Dictionary of Metallurgy. To-Uu. A. D. Merriman and J. S. Bowden. *Metal Treatment and Drop Forging*, v. 23, Nov. 1956, p. 457-464.

Definitions of terms from tophat to ultimate strength. (To be continued.)

2539* (French.) Stainless and Refractory Steels in Aircraft. **Les aciers inoxydables et réfractaires dans l'aéronautique.** L. Guitton. *Métaux, Corrosion-Industries*, v. 31, no. 374, Oct. 1956, p. 407-417.

A survey of the alloy steel used till recently in French aircraft. New requirements for turbines, combustion chambers, and tuyeres. The problem of creep. Application of refractory steels to turbojet engines.

2540 Non-Ferrous Heavy Metal Fabrication in the U. S. A. 253 p. 1954. Organisation for European Economic Co-operation, Paris. (TS370 Or4n)

Report of European specialists studying American techniques of fabricating sheet, strip, rods, sections, tubes, and wire of heavy non-ferrous metals and alloys.

2541 The Production of Reactor Fuel Element. I. From Ore to Uranium Metal. L. M. Wyatt. *Nuclear Power*, v. 1, May 1956, p. 23-28.

Basic design requirements for fuel elements; principles underlying choice of materials and effects on them of reactor operating conditions; the Springfields process for production of U metal from ore.

2542* Processing of Power Reactor Fuels. R. E. Blanco. *Nuclear Science and Engineering*, v. 1, Oct. 1956, p. 409-419.

Chemical principles affecting a multi-purpose centrally located solvent extraction plant which would process all types of heterogeneous fuels.

2543 Glossary of Alloys. *Petroleum Processing*, v. 11, Dec. 1956, p. 87-88.

Lists common alloys by general and trade names, which are used in refinery and petrochemical plants.

2544* (French.) Properties of the Principal Metals and Alloys Produced by Swiss Metallurgical Factories. **Propriétés des principaux métaux et alliages livrés par les usines métallurgiques suisses.** *Pro-Metal*, v. 9, no. 53, Oct. 1956, 5 p.

2545* (French.) Present and Possible Future Uses of Metallic Molybdenum. **Utilisations actuelles et perspectives d'emploi du molybdène métallique.** J. Fabry and P. Gousseland. *SIM-Documentation Métallurgique*, 1956, no. 27, July-Sept. 1956, p. 223-233.

Chemical properties of metallic Mo, especially its behavior in the presence of corrosive agents. Possible applications in remote control engines and nuclear reactors.

2546* (Czech.) Study of Silumin Pistons for Internal Combustion Engines. **Studie siluminových pístů pro spalovací motory.** Přemysl Ryš and Karel Hanák. *Slévárenství*, v. 4, No. 10, Oct. 1956, p. 289-297.

Tests carried out with pistons made from a silumin-type alloy to confirm the experience that pistons with bright surfaces have a greater seizing tendency than pistons with dull surfaces.

2547 Some Recent Advances in Tinplate Manufacturing Processes. W. E. Hoare. 27 p. 1955. Tin Research Institute, Greenford, England. (TS590 T49s)

Characteristics of steel base; annealing; electrolytic and hot-dip tinning; coating weights; tinplate in coil; testing methods.

2548* (German.) High-Quality Cold Deformed Concrete Reinforcing Bars Made of Converter Steel. **Hochwertige kaltverformte Betoneinlagen aus Konverterstahl.** Hubert Hoff and Georg Fischer. *Stahl und Eisen*, v. 76, no. 22, Nov. 1, 1956, p. 1471-1479.

Use of conventional basic converter rimming steel and steel blown with O showing tensile strengths corresponding to steel St37.

2549 Stainless Steel Handbook. 120 p. 1956. Allegheny Ludlum Steel Corp., Pittsburgh. (TA479.S7 Al52s Over.)

Analyses; properties; fabrication; applications.

2550* (Russian.) Effects of Heat Treatment on the Properties of Low-Carbon Rimmed Steel. **Vliianie termicheskoi obrabotki na svoistva kipiashchikh malouglerodistykh stalei.** M. V. Pridantsev and Kh. Sh. Levinzon. *Stal'*, v. 16, no. 11, Nov. 1956, p. 1006-1015.

Heat treating rimmed, low-C steels at high cooling rates makes it possible to obtain practically non-aging metals with improved physical-mechanical properties which are satisfactory substitutes for killed steel and considerably cheaper.

2551* (German.) Malleable Cast Iron. **Der Werkstoff Temperguss.** F. Roll. *VDI Zeitschrift*, v. 98, no. 31, Nov. 1956, p. 1765-1767.

Melting and molding techniques. Alloy tolerances for a satisfactory specimen. New uses from welding this material with steel.

2552* (German.) Molybdenum in Chemical-Resistant Steels and Alloys. **Molybdän in chemisch beständigen Stählen und Legierungen.** L. Wetternik. *Werkstoffe und Korrosion*, v. 7, no. 11, Nov. 1956, p. 628-633.

Molybdenum is used as an alloying constituent in stainless steel and alloys for extensive improvement in the chemical resistance of martensitic and ferritic stainless steels.

2553 Development of U_2Si Epsilon Phase Alloys for Use in Pressurized Water Reactors. R. A. Wolfe, W. E. Bond, W. A. Bostrom, I. Cohen, and R. B. Roof, Jr. *Westinghouse Electric Corporation, Atomic Power Division (U. S. Atomic Energy Commission)*, WAPD-155, July 1956, 73 p. (UF767 Un3.1wa Contin.)

General properties and corrosion behavior of U_2Si alloys, both with and without protective cladding.

2554 Year Book of American Iron and Steel Institute. 268 p. 1956. American Iron and Steel Institute, New York. (TS300 Am35y Vis.)

A collection of papers on steel's depreciation problem, joint responsibility of management and labor, and metallurgical aspects in the design of a new continuous annealing line.

See also: **2417** (metals for gas turbines).

METALS—CORROSION

2555* Cathodic Protection of an Active Ship Using Zinc Anodes. B. H. Tytell and H. S. Preiser. *American Society of Naval Engineers, Journal*, v. 68, Nov. 1956, p. 701-704.

High-purity Zn provided excellent protection; a useful life of 4 or 5 yrs. is anticipated.

2556 Galvanic Corrosion in Water Meters. Herbert F. Barrett. *American Water Works Association, Journal*, v. 48, pt. 1, Oct. 1956, p. 1235-1242.

Laboratory test limitations: definition of galvanic corrosion; common galvanic couples.

2557 Tuberculation of Tar-Coated Cast Iron in Great Lakes Water. Thurston E. Larson, R. V. Skold, and E. Savinelli. *American Water Works Association, Journal*, v. 48, pt. 1, Oct. 1956, p. 1274-1278.

Electrical measurement; roughness; galvanic effect.

2558 (English.) **On the Corrosion of Malleable Iron.** Nobuhisa Tsutsumi. *Castings Research Laboratory, Report, Waseda University*, 1956, no. 7, p. 19-23.

Tests with malleable Fe revealed no superior corrosion properties.

2559* (French.) Corrosion of Iron and Steel by Water. Influence of pH, Oxidizing and Reducing Agents, Chlorides, Phosphates, and Temperature. **Sur la corrosion du fer et des aciers par les eaux. Influence du pH, des oxydants, des réducteurs, des chlorures, des phosphates et de la température.** Marcel Pourbaix. *Centre Belge d'Etude de la Corrosion, Rapport Technique*, no. 40, May 1956, p. 192-208. (TA462 C33r Contin.)

Influence of these factors on the corrosive properties of ordinary and industrial waters in contact with Fe and unalloyed steels was studied in connection with research on chemical and electochemical equilibrium and speed of the reactions. Correct processes for anticorrosive treatment of water and metal were suggested.

2560* (French.) Iron and Steel Corrosion Caused by Water. **Sur la corrosion due fer et des aciers par les eaux.** Marcel Pourbaix. *Centre Belge d'Etude et de Documentation des Eaux*, v. 3, no. 33, 1956, p. 192-208.

Influence of pH, oxidizers, reducers, chlorides, phosphates, and temperature in steel and iron corrosion; techniques for the treatment of water and metals.

2561* (French.) Incrustation—Corrosion—Priming. **Incrustations—Corrosion—Primage.** R. Rath. *Centre Belge d'Etude et de Documentation des Eaux*, v. 3, no. 33, 1956, p. 209-216.

Some problems existing in boilers at high and at very high pressure. Practical suggestions for the future.

2562 Corrosion of Metals. F. Wormwell and E. L. Evans. Paper from "Chemical Engineering Practice". v. II. Academic Press, p. 255-341. (TP155 C42e)

Principles, mechanisms, and prevention.

2563* (German.) Corrosion Phenomena. **Erscheinungsformen der Metallkorrosion.** Fritz Tödt. *Chemiker-Zeitung*, v. 80, no. 20, Oct. 20, 1956, p. 698-703.

Types and mechanisms of corrosion are discussed, including gaseous, stress, and electrochemical attack. Protection and control are considered.

2564* (German.) Effect of Steel Structure on Its Solubility Rate in Acid. **Einfluss des Gefügeaufbaus von Stahl auf die Lösungsgeschwindigkeit in Säure.** Otto Niezoldi. *Chemiker-Zeitung*, v. 80, no. 20, Oct. 20, 1956, p. 721-723.

Concludes that corrosion behavior in HCl is influenced by the primary crystal structure.

2565 Pitting and Cracking. U. R. Evans. *Chemistry & Industry*, 1956, no. 44, Nov. 10, 1956, p. 1291-1297.

Starting places of attack; electrochemical reactions; healing and spreading; corrosion patterns on Zn and Fe; pitting on Al; spots on Sn; pitting on Zn in distilled water; pitting and dislocations; intergranular corrosion; intergranular weakening; stress corrosion cracking.

2566* (German.) Corrosion Study. **Korrosionsstudium. V.** Mechanism of Chemical Passivation and Corrosion of Metals. **Mechanismus der chemischen Passivierung und Korrosion der Metalle.** M. Pražák and V. Pražák. *Collection of Czechoslovak Chemical Communications*, v. 21, no. 3, June 1956, p. 564-570.

Comparison of chemical and electrochemical passivations and corrosion of iron in HNO_3 of various concentrations.

2567 Underground Aluminum Gas Line. R. S. Dalrymple. *Corrosion*, v. 12, Dec. 1956, p. 602-604.

In spite of satisfactory performance of the unprotected pipe tested, it is thought necessary to adequately coat lines in the future and to provide cathodic protection.

2568 Naphthenic Acid Corrosion—An Old Enemy of the Petroleum Industry. W. A. Derungs. *Corrosion*, v. 12, Dec. 1956, p. 617-622.

Corrosion rate depends on concentration of the naphthenic acids in the oil, operating temperature, fluid velocity, and activity of the acids.

2569 Corrosion of Type 347 Stainless Steel and 1100 Aluminum in Strong Nitric and Mixed Nitric-Sulfuric Acids. Charles P. Dillon. *Corrosion*, v. 12, Dec. 1956, p. 623-626.

Failure of stainless steel-clad tank was caused by severe vapor-phase corrosion. Replacement with Al was effective and economical.

2570 A High Potential Magnesium Anode. P. F. George, J. J. Newport, and J. L. Nichols. *Corrosion*, v. 12, Dec. 1956, p. 627-633.

"Galvomag" will deliver from 20 to 30% more current to a polarized cathode than the conventional alloy anodes. Properties, composition, microstructure, and field data are given.

2571 Role of Minor Elements in the Oxidation of Metals. Earl A. Gulbransen. *Corrosion*, v. 12, Dec. 1956, p. 637-643.

Various impurities are considered in terms of their effects on the physical and chemical structure of the oxide, oxide-metal interface, and metal. Eight types of effects are illustrated.

2572 Stress Corrosion Cracking of Monel in Hydrofluoric Acid. H. R. Copson and C. F. Cheng. *Corrosion*, v. 12, Dec. 1956, p. 647-653.

The number and path of the cracks is influenced by composition, cold work, heat treatment, stress, time, and conditions of exposure. Cracking is most prone to occur where corrosion rates are high, such as in moist, aerated vapor.

2573* The Inhibition of Corrosion by Sodium Benzoate. J. H. Kaser. *Corrosion Prevention and Control*, v. 3, Nov. 1956, p. 37-40, 46.

The development and use of sodium benzoate as a corrosion inhibitor. The mechanism of such inhibition considered in the light of recent research.

2574 Deterrence of Hydrogen Blistering. B. W. Neumaier and C. M. Schillmoller. *Corrosion Technology*, v. 3, Nov. 1956, p. 357-361.

Major protective steps taken at fluid-unit gas plant were early removal of H_2S and extensive water-washing, starting at the fractionator overhead system.

2575 Reduction of Corrosion in Ships' Cargo Tanks by Dehumidification. H. J. Dean. *Corrosion Technology*, v. 3, Nov. 1956, p. 362-363.

Observations of six tankers indicate that dehumidification works well, provided it is supplied in adequate quantities at sufficiently frequent intervals.

2576 Formation of Composite Scales Consisting of Oxides of Different Metals. Carl Wagner. *Electrochemical Society, Journal*, v. 103, Nov. 1956, p. 627-633.

A theoretical analysis of diffusion processes during the oxidation of an alloy when oxides of different alloying elements are formed concurrently.

2577* (Russian.) Distribution of Potential Along Piping Using Cathodic Protection. **Raspredelenie potentzialov vdol' trubopovodov pri katodnoi zashchite.** N. A. Tsekun. *Energeticheskii Biulleten'*, 1956, no. 10, Oct. 1956, p. 13-16.

A study of the divergence between theoretical calculations and practical data. Determination of the necessary corrections for existing formulas.

2578 Researches on Corrosion and Inhibition. Reaction Velocity in the System Iron : Dilute Acetic Acid at 40° C. George S. Gardner, Harry L. Faigen, Gregory L. Gibson, and Wilbur S. Hall. *Franklin Institute, Journal*, v. 262, Nov. 1956, p. 369-384.

Equipment and procedure devised for studying the velocity of corrosion reactions under conditions where the amounts of corrodents, both liquid and gaseous, are under careful control. Two commercial corrosion inhibitors were selected for study.

2579* (German.) Passivity of Nickel. Anodic Behavior of Nickel-III. **Studien zur Passivität des Nickels. Studien zum anodischen Verhalten des Nickels III.** G. Trümpler and W. Saxer. *Helvetica Chimica Acta*, v. 39, no. 6, 1956, p. 1733-1741.

Passivation for pure Ni above a certain potential barrier. Behavior of current in transition from an active to a passive state and at various potential levels.

2580 The Attack of Unstressed Metals by Liquid Mercury. J. F. Strachan and N. L. Harris. *Institute of Metals, Journal*, v. 85, Sept. 1956, p. 17-24.

Saturated solubilities and weight losses at room temperature of most of the metallic elements in static liquid Hg were determined by chemical analysis of the solutions and by weighing the specimens.

2581 Corrosion Fatigue. A. J. Gould. Paper from "International Conference on Fatigue of Metals". v. II. Institution of Mechanical Engineers. 9 p. (TA460 In8p Over.)

Testing; associated factors and methods of reducing the severity of attack.

2582 Corrosion Fatigue Cracking Resulting From Wetting of Heated Metal Surfaces, With Special Reference to Steam Power Plant. A. H. Goodger. Paper from "International Conference on Fatigue of Metals". v. II. Institution of Mechanical Engineers. 9 p. + 6 plates. (TA460 In8p Over.)

Typical examples of cracking; conditions for cracking; mechanism of attack; effect of temperature on endurance; detection and remedial measures.

2583 Fatigue of Large Shafts by Fretting Corrosion. O. J. Horger. Paper from "International Conference on Fatigue of Metals". v. II. Institution of Mechanical Engineers. 11 p. + 2 plates. (TA460 In8p Over.)

Fatigue resistance of press-fitted assemblies was comparatively less influenced by type of steel, tensile properties, or whether the shafts were normalized and tempered or quenched and tempered, than by subcritical quenching to obtain favorable residual thermal compressive stresses on the surface.

2584 Fretting Corrosion and Its Influence on Fatigue Failure. A. J. Fenner, K. H. R. Wright, and J. Y. Mann. Paper from "International Conference on Fatigue of Metals". v. II.

Institution of Mechanical Engineers. 10 p. + 4 plates. (TA460 In8p Over.)

Characteristics and mechanism of fretting; the fretting behavior of non-ferrous surfaces; fretting corrosion and service failures.

2585 An Investigation on the Corrosion Fatigue of Marine Propeller Shafts. Saburo Hara. Paper from "International Conference on Fatigue of Metals". v. II. Institution of Mechanical Engineers. 6 p. + 6 plates. (TA460 In8p Over.)

Fatigue strength of small steel specimens subjected to sea-water corrosion; process of origination and growth of cracks; comparison between appearance of failure in small specimens and actual propeller shafts.

2586* (Russian.) Investigation of the Effectiveness of Cathodic Protectors Made of Aluminum Zinc Alloys. **Issledovanie effektivnosti protektorov iz splavov aliuminiia tsinkom.** V. V. Gerasimov and I. L. Rozenfeld. *Izvestiia Akademii Nauk SSSR, Otdelenie Khimicheskikh Nauk*, 1956, no. 9, Sept. 1956, p. 1050-1052.

Investigation of stationary electrode potentials, magnitude of protective current, anodic polarization, and stability of six alloys.

2587 (Dutch.) Cathodic Protection. **Kathodische beschermimg.** J. W. Boon. *Metaalinstituut T. N. O.*, 1956, no. 42, July 1956, 14 p. (TN603 M56p Contin.)

Cathodic protection according to electricity and electrochemistry; electrolytic method; criteria of perfect protection.

2588 (Dutch.) Determination of the Average Specific (Electric) Soil Resistivity. **Het bepalen van de gemiddelde specifieke (electrische) weerstand van de bodem.** J. W. Boon. *Metaalinstituut T. N. O.*, 1956, no. 43, July 1956, 59 p. + 53 tables. (TN603 M56p Contin.)

Describes and evaluates the Wenner and Shepard methods.

2589* (German.) Corrosion, Cracking and Erosion on the Outer Surface of Copper-Alloy Condenser Tubing. **Korrosion, Rissbildung und Erosion an der Aussenfläche von Kondensator-rohren aus Kupferlegierungen. II.** F. W. Nothing. *Metall*, v. 10, nos. 21-22, Nov. 1956, p. 1033-1038.

Stress corrosion; cracking and corrosion. Corrosion fatigue and erosion.

2590* (Russian.) Gas Corrosion of Austenitic Steels at High Temperatures. **Gazovaia korroziia austenitnykh stalei pri vysokoi temperature.** E. A. Davidovskaia and L. P. Kestel. *Metallovedenie i Obrabotka Metallov*, 1956, no. 10, Oct. 1956, p. 29-34.

Study of a series of heat-resistant alloy steels relative to gas turbine installations.

2591* (Italian.) Protecting Ammonium Sulfate Cristallizers by Means of Inhibitors. **Protezione dei cristallizzatori di solfato ammonico mediante inihitori.** G. Roberti, F. Gianni, and G. Bombara. *Metallurgia Italiana*, v. 48, no. 6, June 1956, p. 281-286.

Protective influence of 15 different materials. Copper sulfate, potassium bichromate, hydrogen peroxide, and sodium arsenite develop a very good inhibiting action.

2592 Corrosion-Fatigue. P. T. Gilbert. *Metallurgical Reviews*, v. 1, pt. 3, 1956, p. 379-417 + 2 plates.

Corrosion-fatigue testing; characteristics; effect of variations in corrosive environments; data for various materials; relationship of failures to microstructure; electrochemical aspects; countermeasures.

2593* Corrosion-Fatigue Testing in Highly Corrosive Media. W. P. McKinnell, Jr., F. H. Beck, and M. G. Fontana. *News in Engineering at Ohio State University*, v. 28, Nov. 1956, p. 28-32.

Reverse-bending fatigue-testing machine was selected for conversion to corrosion-fatigue testing. For the fuming nitric acid corrosion-fatigue tests, Ti and stainless steel were the materials whose properties were investigated.

2594 The Action of Sodium Hydroxide Melts on Alloys of Nickel, Molybdenum, and Iron at 815°C. G. P. Smith and E. E. Hoffman. *Oak Ridge National Laboratory (U. S. Atomic Energy Commission)*, ONRL-2131, Nov. 1956, 7 p. (UF767 U3o Contin.)

Reaction mechanism involves selective leaching of Fe and Mo from solid solution with Ni and a resultant formation of subsurface porosity. Alloys containing at least 70% Ni showed more resistance to corrosion than others tested.

2595* Corrosion. Howard P. Kallen. *Power*, v. 100, Dec. 1956, p. 73-108.

Why metals corrode, corrosion types; combatting corrosion; testing; anti-corrosion programs.

2596* Temporary Protective Coatings for Metals. III. Corrosion Control by Cathodic Protection. E. Strong. *Product Finishing*, v. 9, Nov. 1956, p. 82-95, 128.

Electrode potentials of various metals. Theoretical aspects, current requirements, and advantages of cathodic protection. (To be concluded.)

2597 (Polish.) Investigation of Erosion-Corrosion Phenomena Caused by Neutral Salt Solutions Carrying Solid Suspensions. **Badania nad współdziałaniem erozji z korozja w obojętnych roztworach solnych niosacych zawiesinę stała.** M. Śmialowski and J. Siejka. *Przemysł Chemiczny*, v. 12, no. 10, Oct. 1956, p. 569-571.

Loss in weight of two types of steel (T -45 steel of 0.10% Cr content and TR-2 steel of 1.14% Cr) was compared after rotating in solutions of NaCl containing suspended sand or SiC.

2598* (Czech.) Resistance of Materials Used for High-Pressure Valves Against Erosion Action of Steam. **Odolnost energetických zařízení proti erosi vodní parou.** K. Löbl and F. Černy. *Strojírenstvi*, v. 6, no. 10, Oct. 1956, p. 689-693.

Methods of testing the resistance of materials to erosion, comparison tests of various hard alloys, and selection of adequate materials.

2599* (German.) Oxidation of Refractory Carbide Alloys. **Oxydation von Karbidlegierungen für Hochtemperaturzweke.** J. Hinnüber, O. Rüdiger, and W. Kinna. *Technische Mitteilungen Krupp*, v. 14, no. 5, Nov. 1956, p. 140-142.

Influence of W, Cr, and Ta additions on the oxidation of Ti carbide Co alloys. Application to Co free hard metals. Microscopic and X-ray examination of the oxide layers.

2600* (German.) The Problems of the Protection Against Corrosion and the Materials in Modern Acid Engineering. **Korrosionsschutz- und Werkstoff-Probleme des modernen Säurebaues.** Günter Schücking. *Werkstoffe und Korrosion*, v. 7, no. 11, Nov. 1956, p. 615-626.

Review of methods of protection against corrosion by acids and the construction of acid-proof installations and buildings.

2601* (German.) Studies on the Corrosion of Iron. **Beitrag zur Korrosion des Eisens.** Shigeto Yamaguchi and Yoshio Aoyama. *Werkstoffe und Korrosion*, v. 7, no. 11, Nov. 1956, p. 626-628.

Properties and formation of ferromagnetic and paramagnetic iron oxides.

2602* (German.) The Behavior of Materials With Regards to Fluorine. **Das Verhalten der Werkstoffe gegenüber Fluor.** E. Lingnau. *Werkstoffe und Korrosion*, v. 7, no. 11, Nov. 1956, p. 634-641.

A review of data on F shows that resistant materials are Ni-30% Cu alloys, and for dry F non-alloy steels, Cu, and Al.

2603* (German.) The Oxidation of Titanium. **Oxydation von Titan.** Per Kofstad and Karl Hauffe. *Werkstoffe und Korrosion*, v. 7, no. 11, Nov. 1956 p. 642-649.

Temperature-time relationships are established for the reaction.

2604* (German.) The Phenomenon of the So-Called "Phenol Corrosion" of Telephone Cables. **Das Phänomen der sog. "Phenolkorrosion" von Telephonkabeln.** W. Hess. *Werkstoffe und Korrosion*, v. 7, no. 11, Nov. 1956, p. 649-652.

Concludes that the biological decomposition of the jute, and not phenol, is producing the special type of corrosion.

2605* (German.) On the Behavior of Materials in Sulfuric Acid. **Einiges über das Verhalten von Werkstoffen gegenüber Schwefelsäure.** Erich Rabald. *Werkstoffe und Korrosion*, v. 7, no. 11, Nov. 1956, p. 652-662.

The behavior of metals and non-metals is given. Discusses the influences of different additives on corrosion.

2606* (Russian.) Methods of Testing Welded Joints in the Reinforcement of Reinforced-Concrete Structures. **Metodika ispytanii svarnykh uzlov armatury zhelezobetonnykh konstruktsii.** A. Ia. Brodskii. *Zavodskaia Laboratoriia*, v. 22, no. 10, Oct. 1956, p. 1220-1224.

Design and use of apparatus for testing strength of welded and unwelded joints of the reinforcing framework. Relation between strength of weld and length of time under current.

2607* (Russian.) Passivity of Steel in Nitrose. **O passivnosti stali v nitrozakh.** E. I. Litvinova. *Zhurnal Prikladnoi Khimii*, v. 29, no. 10, Oct. 1956, p. 1521-1529.

Formation of protective salt films on steel immersed in mixtures of sulfuric and nitric acids.

See also: **2311** (corrosion costs); **2456** (rust inhibitors); **2832** (Al-Zn anodes in sea water).

METALS—EXTRACTION AND REFINING

2608* (German.) Method to Produce Aluminum Alloys With High-Melting Elements. **Verfahren zur Herstellung von Aluminium-legierungen mit hochschmelzenden Elementen. II.** F. Erdmann-Jesnitzer and K. H. Erler. *Aluminium*, v. 32, no. 11, Nov. 1956, p. 712-716.

A mixture of metal oxides and Al turnings are scattered on the surface of the molten Al and ignited with an electric arc.

2609 The Changing Open-Hearth Picture. Kenneth C. McCutcheon. *Blast Furnace and Steel Plant*, v. 44, Dec. 1956, p. 1411-1416.

Comparison of 1947 with 1956 operating data.

2610 Vanadium in Acid Steelmaking Process and Deoxidizing Power of Vanadium. I. A. Popov and B. V. Stark. *Henry Brutcher Translation No.* 2843-B, 12 p. (From *Izvestiya Akademii Nauk SSSR, OTN*, 1951, no. 2, p. 261-266.) Henry Brutcher, Altadena, Calif.

Vanadium forms a phase of the $FeO \cdot V_2O_5$ type. Reducing ability of V is less than that of Si.

2611 Lining of Blast Furnaces With Carbon Brick. A. Send. *Henry Brutcher Translation No.* 3185, 13 p. (From *Stahl und Eisen*, v. 71, no. 25, 1951, p. 1361-1365.) Henry Brutcher, Altadena, Calif.

Previously abstracted from original. See item 1133, v. 1, Feb. 1952.

2612 Effect of Mold Wall Thickness Upon Solidification of Ingots. N. N. Rubtsov and G. F. Balandin. *Henry Brutcher Translation No.* 3209, 17 p. (From *Liteinoe Proizvodstvo*, 1952, no. 4, Apr. 1952, p. 16-19.) Henry Brutcher, Altadena, Calif.

Solidification time for steel ingots as a function of thickness of gray-iron mold; variation in temperatures of outside and inside mold walls during solidification of steel ingots. Calculations using the method of successive approximations.

2613 Effect of Addition of Metallic Bismuth to Liquid Steel. V. S. Bozhko. *Henry Brutcher Translation No.* 3216, 5 p. (From *Trudy Instituta Chernoi Metallurgii*, v. 7, 1953, p. 54-56.) Henry Brutcher, Altadena, Calif.

Influence of additions in the ladle, mold, or bottom-pouring mechanism upon casting properties, non-metallic inclusions, and mechanical characteristics.

2614 Lining of Top-Blown Oxygen Converters at Donawitz (Austria) Steelworks. A. Wegscheider. *Henry Brutcher Translation No.* 3783, 14 p. (Abridged from *Stahl und Eisen*, v. 76, no. 10, 1956, p. 595-599.) Henry Brutcher, Altadena, Calif.

Previously abstracted from original. See item 9594, v. 5, Aug. 1956.

2615 Development and Industrial Application of Continuous Casting of Steel. M. S. Boichenko, V. S. Rutes, and N. A. Nikolaev. *Henry Brutcher Translation No.* 3818, 18 p. (Abridged from *Stal'*, v. 16, no. 6, 1956, p. 505-513.) Henry Brutcher, Altadena, Calif.

Previously abstracted from original. See item 14692, v. 5, Nov. 1956.

2616 Industrial-Scale Trials on the Injection of Argon for Flushing Hydrogen Out of Arc and O. H. Steel Baths. M. Imai, T. Nakayama, and H. Ōi. *Henry Brutcher Translation No.* 3827, 5 p. (Abridged from *Tetsu to Hagane*, v. 41, no. 9, Sept. 1955, p. 1033-1034.) Henry Brutcher, Altadena, Calif.

Effect of A flushing shortly before the tap on H content of Cr steels and plain C steels. Bath compositions before A injection; data on procedure in treating baths with A.

2617* A Metallographic and Mineralogical Study of a Basic Open Hearth Heat. Peter M. Power and John C. Campbell. *Canadian Mining and Metallurgical Bulletin*, v. 49, no. 535, Nov. 1956, p. 793-802.

As the various impurities in the bath are oxidized, the metal structure changes from that of high-phosphorus white cast iron to that of low-carbon steel. Phosphorous distribution was studied. The acid run-off slag has an acicular orthosilicate structure which changes on "shape-up" to a very basic tricalcium silicate and Ca ferrite structure.

2618* (French.) Simultaneous Preparation of Calcium and Silico-Aluminum. **Préparation simultanée de calcium et de silico-aluminium.** Jean-Lucien Andrieux and Étienne Bonnier. *Comptes Rendus*, v. 243, no. 18, Oct. 29, 1956, p. 1259-1262.

Alloys of Si-Ca and Al-Ca were simultaneously treated in vacuum at 1300 C. Properties of the metal and residue; production of light foundry alloys.

2619* (Russian.) The Structure of Magnetite in the Reaction Diffusion Layers in the Reduction of Hematite. **O strukture magnetita v sloiakh reaktsionnoi diffuzii pri vosstanovlenii gematita.** V. I. Arkharov and V. N. Bogoslovskii. *Fizika Metallov i Metallovedenie*, v. 3, no. 2, 1956, p. 254-268.

Details of the reduction process gained by studying the peculiarities of the structure of the magnetite phase. Regulating the kinetics of iron oxide reduction.

2620* (Russian.) Refining Tellurium and Antimony. **Ochistka tellura i surmy.** F. I. Vasenin. *Fizika Metallov i Metallovedenie*, v. 3, no. 2, 1956, p. 360-362.

Use of a special retort-dephlegmator for distilling Te and Sb of very high purity.

2621 Vacuum Treating Nonferrous Melts at the U.S. Naval Gun Factory. Vincent DePierre and Shingo Inouye. *Foundry*, v. 84, Dec. 1956, p. 108-114.

Vacuum treating procedure used in two production units for non-ferrous melts. The smaller treats 200 lb. of Al or 600 of bronze; the larger treats 600 lb. of Al or 1800 of bronze.

2622* (Czech.) Thermal Effect of Artificially Moistened Blast on the Processes in the Blast-Furnace Hearth. **Tepelný účinek uměle vlhčeného větru na pochod v nístěji.** Miroslav Prouza. *Hutnické Listy*, v. 11, no. 10, Oct. 1956, p. 577-579.

Effect of humid air on heat balance of blast-furnace hearth. Use of vapor is inseparably combined with the preheating of air to high temperature.

2623* (Czech.) Treatment of Stainless Scrap With Oxygen in Open-Hearth Furnace. **Zpracování antikorosního odpadu kyslíkem v Siemens-martinově peci.** V. Černý and Zdenko Zdenek. *Hutnické Listy*, v. 11, no. 10, Oct. 1956, p. 579-583.

Chromium-nickel and Cr-Ni-Mo wastes treated with O in the open-hearth furnace can be easily rolled and have good corrosion resistance.

2624 Heat Transfer in the Open Hearth Furnace. II. M. W. Thring. *Industrial Heating*, v. 23, Nov. 1956, p. 2384, 2386, 2388, 2390.

The effects of various improvements in furnace operation on the calculations are considered and a comparison is made between calculated thermal efficiency and efficiency actually observed.

2625 Some Methods for Analyzing and Controlling an Open Hearth Operation. Eugene H. Swett. *Iron and Steel Engineer*, v. 33, Nov. 1956, p. 109-113.

Statistical analysis of certain variables illustrates their effect upon production rate or product quality.

2626* The Evaporation of Impurities From Silicon. S. E. Bradshaw and A. I. Mlavsky. *Journal of Electronics*, v. 2, ser. 1, Sept. 1956, p. 134-144 + 1 plate.

Equations describing the combined effects of evaporation and segregation are derived, and the rates of evaporation of certain impurities calculated.

2627 The First Half-Century of Electric Furnace Steel Making. S. B. Casey, Jr. *Journal of Metals*, v. 8, Dec. 1956, p. 1637-1641.

Evolution of furnace design; development of electrical equipment; other developments cutting down time and speeding operation; expectations from the second half century.

2628 Sponge Iron and H-Iron for Electric Furnace Charging. P. E. Cavanagh. *Journal of Metals*, v. 8, Dec. 1956, p. 1642-1644.

Use of virgin melting stock means lower furnace operating costs, lower rolling, forging, and annealing costs, and improved customer relations resulting from a known and uniform quality steel.

2629 Desiliconized Pig Iron for the Electric Furnace—A Possibility. S. L. Case. *Journal of Metals*, v. 8, Dec. 1956, p. 1645.

The advantages of desiliconizing the pig before charging make an important difference in costs.

2630 Equilibria in Reactions of Hydrogen, and Carbon Monoxide With Dissolved Oxygen in Liquid Iron; Equilibrium in Reduction of Ferrous Oxide With Hydrogen, and Solubility of Oxygen in Liquid Iron. Nev A. Gokcen. *Journal of Metals*, v. 8; *American Institute of Mining and Metallurgical Engineers, Transactions*, v. 206, Nov. 1956, p. 1558-1567.

The results are expressed in thermodynamic functions, and correlated with new data on the standard free energies of H_2, H_2O, O_2, CO, and CO_2.

2631 Hydrogen in Steelmaking Slags. J. H. Walsh, J. Chipman, T. B. King, and N. J. Grant. *Journal of Metals*, v. 8; *American Institute of Mining and Metallurgical Engineers, Transactions*, v. 206, Nov. 1956, p. 1568-1576.

Slag and metal samples from a number of industrial heats were analyzed and the important role of the slag in determining the H content of the metal was confirmed.

2632* (Russian.) Overheating of Side-Blown Converter Steel. **O peregreve malobessemerovoi stali.** V. A. Fuklev and L. K. Grakhov. *Liteinoe Proizvodstvo*, 1956, no. 10, Oct. 1956, p. 9-10.

Overheating of steel in relation to Si and C contents.

2633* (Russian.) Teeming of Steel With Arc-Heating of Deadhead. **Razlivka stali s elektrodugovym obogrevom pribyli.** B. N. Popov. *Metallurg*, 1956, no. 9, Sept. 1956, p. 19-22.

Method and installation for arc heating. Economics and advantages for rolling.

2634* (Russian.) Use of Fluxes to Reduce Slag Viscosity in Casting Molds When Teeming Rimmed Steel. **Primenenie plavnei dlia razzhizheniia shlaka v islozhnitsakh pri razlivke kiniaschei stali.** K. S. Alferov, V. O. Kulikov, and T. G. Kovaleva. *Metallurg*, 1956, no. 9, Sept. 1956, p. 22-24.

Addition of flux, like ground glass, to reduce slag area on rimmed steel; its intrusion into the steel.

2635* (Russian.) Mechanized Removal of Refractory Lining From Steel Casting Ladle. **Mekhanizatsiia lonki futerovki staleraslivochynkh kovshei.** S. D. Khotsenskii and K. K. Puzatov. *Metallurg*, 1956, no. 9, Sept. 1956, p. 37.

Practical method removal by means of wire run behind the lining.

2636* (Russian.) Increasing the Durability of Ladles. **Uvelichenie Stoikosti Kovshei.** N. A. Rokhlin. *Metallurg*, 1956, no. 10, Oct. 1956, p. 19-20.

Introduction of heavy lining for teeming ladles, permitting up to 11 melts.

2637* (Russian.) Using Aluminum Powder for Melting Ferrotitanium. **Ispol'zovanie Aliuminievoi Pyli Dlia Vyplavki Ferrotitana.** P. F. Snezhko. *Metallurg*, 1956, no. 10, Oct. 1956, p. 21-22.

Melting of the furnace charge with a pulverized fraction of Al took place smoothly and was accompanied by a considerable reduction of Ti. The consumption of Al was sharply reduced.

2638 The Pyrometallurgy of Halides. W. J. Kroll. *Metallurgical Reviews*, v. 1, pt. 3, 1956, p. 291-337.

Recent progress in the use of halides in extractive metallurgy is reviewed.

2639* (German.) Slag Regulation During the Production of Manganese-Rich Pig Iron in the Low-Shaft Blast Furnace. **Schlackenführung bei der Erzeugung von manganreichem Roheisen im Niederschachtofen.** Georg Brückner. *Neue Hütte*, v. 1, no. 8, Sept. 1956, p. 449-456.

Influence of slag components upon melting heat, melting temperature, and viscosity. Optimum slag composition and other variables.

2640 Zone Melting by Electric Arc. R. D. Burch. *North American Aviation, Inc. (U. S. Atomic Energy Commission)*, NAA-SR-1688, Nov. 1956, 16 p. (UF767 Un3.1na Contin.)

Apparatus uses d.c. arc to produce a molten region. Specimen metal bar rests on a water-cooled hearth and serves as an anode.

2641 Progress Report of Pilot Plant Section Raw Materials Process Testing. *Oak Ridge National Laboratory (U. S. Atomic Energy Commission)*, ORNL-1970, Jan. 1955, 18 p. (UF767 U3o Contin.)

Processes studied are extraction of U and V with an amine reagent, mixing and phase separation, and slurry extraction.

2642* (German.) Investigations for Testing the Behavior of Ores in the Blast Furnace. **Untersuchungen zur Prüfung des Verhaltens von Erzen in Hochofen.** Jacob Willems, Peter Dickens, and Wilhelm vor dem Esche. *Stahl und Eisen*, v. 76, no. 22, Nov. 1, 1956, p. 1404-1409.

Studies the expansion and softening values of ores and sinters and the mineralogical structure of the ores.

2643* (German.) Measuring Temperature in the Basic Converter. **Die Temperaturmessung im blasenden Thomaskonverter.** Helmut Knüppel, Karl Ernst Mayer, Gert Wiethoff, Kurt Doffin, and Walter Koch. *Stahl und Eisen*, v. 76, no. 22, Nov. 1, 1956, p. 1410-1416.

Apparatus and its uses are described. Practical results are given.

2644* (German.) Non-Metallic Deposits on the Sprue and Wear of Runner Bricks With Killed Open-Hearth Steels. **Nichtmetallische Abscheidungen auf den Giessknochen sowie Kanalsteinverschleiss bei beruhigten Siemens-Martin-Stahlen.** Karl Georg Speith, Hans vom Ende, and Hans-Joachim Seelisch. *Stahl und Eisen*, v. 76, no. 22, Nov. 1, 1956, p. 1426-1441.

Tests with runner bricks having different alumina contents for pouring soft and medium hard killed steels.

2645* (German.) The Causes of Blast Furnace Explosions and Conclusions to be Drawn for the Design and Operation of Blast Furnaces. **Ursachen von Hochofenexplosionen und Folgerungen für Bau und Betriebsweise von Hochöfen.** Werner Feldmann. *Stahl und Eisen*, v. 76, no. 23, Nov. 15, 1956, p. 1541-1553.

Explosions are dependent on the blast furnace operation. Safety measures to be taken.

2646* (German.) The Pre-Refining Plant of the Eisenwerk-Gesellschaft Maximilianshütte A. G. at Sulzbach-Rosenberg. **Die Vorfrischanlage der Eisenwerk-Gesellschaft Maximilianshütte A. G. in Sulzbach-Rosenberg.** Johann Sittard. *Stahl und Eisen*, v. 76, no. 23, Nov. 15, 1956, p. 1554-1561.

Details of various schemes tried at the above plant.

2647* (Russian.) New Investigation of the Coke-Combustion Process in Tuyere Area of a Blast Furnace. **Novye issledovaniia protsessa goreniia koksa u furm domennoi pechi.** M. Ia. Ostroukhov and L. Z. Khodak. *Stal'*, v. 16, no. 10, Oct. 1956, p. 867-872.

Study of the vortex character of gas motion in the oxidation zone. Useful data for operation.

2648* (Russian.) Feeding Oxygen in the Jet of a High Capacity Open-Hearth Furnace During Remelting of Phosphorus Cast Iron. **Podacha kisloroda v fakel bol'shegruznoi martenvoskoi pechi pri peredele fosforistykh chugunov.** *Stal'*, v. 16, no. 10, Oct. 1956, p. 875-882.

Introduction of O results in reduction of smelting time, and a 17% increase in furnace capacity with no detrimental effect on steel quality.

2649* (Russian.) Processes of Solidification and Heat Transfer Under Conditions of Continuous Teeming. **Protsessy zatverdeniia i teplootdachi v usloviiakh nepreryvnoi raslivki.** *Stal'*, v. 16, no. 10, Oct. 1956, p. 883-890.

Application of thermo-hydraulic integrator for determination of optimum working parameters.

2650* (Russian.) Using Oxygen in Electrosteel Melting. **Praktika primenoniia kisloroda pri vyplavke elektrostali.** N. I. Shutkin. *Stal'*, v. 16, no. 10, Oct. 1956, p. 890-894.

Oxygen introduction permits a 30 to 35% increase in capacity and a 35 to 50% decrease in electrical energy consumption with no detriment to the metal quality.

2651* (Russian.) Calculation of Self-Sintering Electrode Diameters of Ore-Reducing Electric Furnaces. **Raschet diametra samospekainshchikhsia elektrodov rudovasstanovitel' nykh elektricheskikh pechei.** E. M. Alekseev. *Stal'*, v. 16, no. 10, Oct. 1956, p. 894-896.

Relation between current density and the specific consumption of the electrode mass per 1000 k.e.v. hr. of energy used.

2652* (Russian.) The Operation of Blast Furnaces With Gas at a Gage Pressure of 0.8. **Rabota domennykh pechei na davlenii gaza pod koloshnikom 0.8 ati.** P. F. Sergeev and N. I. Vasil'chenko. *Stal'*, v. 16, no. 11, Nov. 1956, p. 963-971.

Increasing output, lowering coke consumption, and reducing flue dust by raising the pressure of the gas at the throat of the blast furnace. Equipment required and changes made.

2653* (Russian.) The Operating Periods of Blast Furnaces. **O srokakh sluzhby domennykh pechei.** N. G. Molchanov. *Stal'*, v. 16, no. 11, Nov. 1956, p. 972-974.

Construction of a blast furnace which would lengthen the period of operation. The proper use of C and highly aluminous materials.

2654* (Russian.) Reducing Rimmed Steel in the Ladle With Ferromanganese. **Praktika raskisleniia kipiashchei stali v kovshe ferromargantsem.** I. I. Bornatskii, K. S. Alferov, and V. I. Prilepskii. *Stal'*, v. 16, no. 11, Nov. 1956, p. 977-983.

Test results indicate that the method produces satisfactory metal with an average saving in ferromanganese of about 22%.

2655* (Russian.) Using Compressed Air in Open Heat Furnaces. **Primenenie kompressornogo vozdukha v golovkakh martenovskikh pechei.** V. N. Kazantsev. *Stal'*, v. 16, no. 11, Nov. 1956, p. 984-988.

Using compressed air at a pressure of 4 atmospheres shortens the smelting process to 40 to 50 min. Description of burners, operating pressures, and conditions.

2656* (Russian.) Analysis of Indices and Peculiarities of Electrosmelting Ferrosilicon and Chromium-Silicon at Two Plants. **Analiz pokazatelei i osobennostei elektroplavki ferrosilitsiia i silikokhroma na dvukh zavodakh.** V. V. Rukavishnikov and V. A. Kravchenko. *Stal'*, v. 16, no. 11, Nov. 1956, p. 989-993.

A comparison of output at two plants. Effects of depth of immersion of electrodes in the charge; proper slag treatment.

2657 More Iron Without More Furnaces. I. Lowering the Coke Rate. II. Increasing the Driving Rate. Charles M. Squarcy and Richard J. Wilson. *Steel*, v. 139, Nov. 19, 1956, p. 150 + 5 pages; Nov. 26, 1956, p. 98 + 4 pages.

Experience with high top pressure furnaces; effects of O enrichment and steam injection; other factors affecting production rate.

2658 Electric Smelting of Low-Grade Chromite Concentrates. J. P. Walsted. *U. S. Bureau of Mines, Report of Investigations* 5268, Oct. 1956, 28 p. (TN21 Un3r)

Proper proportioning includes the correct level of reductant, enough bulk to provide porosity, and the minimum amount of flux to provide a minimum amount of slag of good fluidity.

See also: **1862** (polishing and cleaning materials); **2091** (activities in molten salt mixtures); **2316** (steelmaking energy requirements); **2325** (costs of electric steel melting).

METALS—FINISHING, POLISHING, AND CLEANING

2659* (German.) Studies of the Mechanism of Brightening of Aluminum and Aluminum Alloys. **Untersuchungen über den Glänzmechanismus an Oberflächen von Aluminium und Aluminium-legierungen. II.** F. Baumann and H. Ginsberg. *Aluminium*, v. 32, no. 11, Nov. 1956, p. 706-711.

Reactions of Al with the Erftwerk brightening bath; the chemical nature of brightened Al surfaces.

2660* Electrolytic and Chemical Methods of Metal Brightening. H. Silman. *Birmingham Metallurgical Society, Journal*, v. 37, Sept. 1956, p. 417-430.

Theoretical considerations; tanks and racks; applications; methods used on stainless steels, Cr, Fe, and Al.

2661* (Czech.) Mechanical Descaling of Wire. **Mechanické odokujování drátu.** Stanislav Hájek. *Hutnik*, v. 6, no. 9, Sept. 1956, p. 271-275.

Descaling by pickling is being replaced by mechanical descaling. Description of various mechanical descaling equipment. Economic considerations.

2662 Cleaning Metals and Alloys. C. B. F. Young. *Metal Finishing*, v. 54, Nov. 1956, p. 56-59, 65.

Alkaline cleaners; wetting agents; non-ionic surface-active agents; typical cleaning processes; simplifying the cleaning process.

2663* (German.) Chemical Polishing of V2A-Steel With Gases. **Chemisches Glänzen von V2A-Stahl mit Gasen.** G. Schmid, E. Maurer, and H. Steinhausen. *Metalloberfläche*, v. 10, no. 10, Oct. 1956, p. 289-295.

Application of NO_2, HCl and steam for steel polishing. Optimum procedures and temperature are given.

2664* (German.) Processes During Chemical and Anodic Polishing of Metal Surfaces. **Über die Vorgänge beim chemischen und anodischen Glänzen von Metalloberflächen.** Helmut Brünner. *Metalloberfläche*, v. 10, no. 10, Oct. 1956, p. 295-299.

Requirements of electrolytes for polishing; comparison of chemically polished and electrochemically polished surfaces. Practical applications.

2665 Sodium Hydride Descaling Process. W. F. S. Taylor. *Metal Treatment and Drop Forging*, v. 23, Nov. 1956, p. 465-468.

Principles and applications of descaling equipment.

2666 Surface Treatment and Finishing of Aluminium and Its Alloys. S. Wernick and R. Pinner. 580 p. 1956. Robert Draper Ltd., Teddington, England. (TN775 N49s)

Includes information on protective and decorative finishes, such as anodizing, dyeing, electro-deposition, and conversion coatings, mechanical surface treatments and finishes, electrolytic and chemical polishing, cleaning, hard Cr plating, organic finishing, vitreous enamelling, and metal spraying.

See also: **2218** (finishing of Al); **2259** (waveguide surface finish); **2920** (polishing of brass).

METALS—FOUNDRY PRACTICE

2667 Design and Production of Aluminum Castings. G. W. Birdsall. *Aero Digest*, v. 73, Nov. 1956, p. 13-19.

Data to help designers select the casting process and Al alloy best suited for product requirements. Includes casting tolerances, corrosion resistance, fabricating characteristics, and comparison of casting methods.

2668 Control of Shrinkage Defects in Cast Iron. I. John Allan. *Canadian Metals*, v. 19, Nov. 1956, p. 36, 38, 40, 42.

Types of shrinkage; gating and metal composition; pouring; metal temperature; melting conditions; sand deformation. (To be concluded.)

2669* (English.) **On Heredity of Pig-Iron. II. Effects of Various Gas-Bubblings Into Molten Pig-Irons.** Ichiro Iitaka, Kokichi Nakamura, and Masao Kikuchi. *Castings Research Laboratory, Report, Waseda University*, 1956, no. 7, p. 1-5.

Experiments with H and O. Comparisons with Mg additions.

2670* (English.) **Gas Pressure in Mold Cavity. I.** Mototaka Mutaguchi. *Castings Research Laboratory, Report, Waseda University*, 1956, no. 7, p. 29-32.

Relations between pressure and permeability, temperature and permeability, and temperature and mean mol. wt.

2671* (English.) **Inorganic Binders for Molds; Especially on Soda Silicate-Prepared for the CO_2 Process.** Hisao Miyasaka. *Castings Research Laboratory, Report, Waseda University*, 1956, no. 7, p. 33-40.

Experiments with four different types of water glasses; chemical reaction involved.

2672* (French.) Practical Advice to Founders. **Conseils pratiques aux fondeurs.** *Fonderie*, 1956, no. 128, Sept. 1956, p. 358-366.

Some practical rules for the correct construction of cast iron or steel flasks for hand-finishing.

2673 Shrinkage in Gray Cast Iron. John Allan. *Foundry*, v. 84, Dec. 1956, p. 88-95.

Methods of casting; problems and defects of shrinkage; controlled progressive solidification. Recommendations for solving these problems.

2674 Brass Foundry Molding. Harry St. John. *Foundry*, v. 84, Dec. 1956, p. 104-107.

Basic fundamentals of grain size and shape, bonding materials, additives, and processing as they affect molding sands.

2675 Dimensioning of Risers for Nodular Iron Castings. H. F. Bishop and C. G. Ackerlind. *Foundry*, v. 84, Dec. 1956, p. 115-119.

System for determining the smallest risers which can be employed on nodular iron castings with under-riser shrinkage.

2676 Design, Construction and Running of a Water-Cooled Balanced-Blast Cupola and Its Performance Compared With a Similar Brick-Lined Cupola. W. Y. Buchanan. *Foundry Trade Journal*, v. 101, Nov. 1, 1956, p. 497-508.

2677 Effect of Vibrations During Solidification on the Mechanical Properties of Castings of Gas-Turbine Materials. Jerzy Jagaciak and Josiah W. Jones. *Foundry Trade Journal*, v. 101, Nov. 22, 1956, p. 595-603.

Tests on H.R. Crown Max and Nimonic C75 show an over-all improvement in properties.

2678 Melting by Induction. II. High Frequency Furnace Applications. Frank T. Chestnut. *Industrial Heating*, v. 23, Nov. 1956, p. 2356 + 6 pages.

Application of H.F. furnace for melting steels, Cu alloys, and other metals.

2679 The Refinement of Cast Grain-Size in Copper-Aluminium Alloys Containing 7-9 Per Cent Aluminium. J. P. Dennison and E. V. Tull. *Institute of Metals, Journal*, v. 85, Sept. 1956, p. 8-10.

Introduction of selected nucleating compounds showed that in the alloys in which the α-phase solidifies first, moderate refinement may be produced by additions of Mo, Nb, W, or V of the order of 0.1%.

2680* (Russian.) Use of Oxygen in Cast Iron Production. **Voprosy primeneniia kisloroda v proizvodstve chugunnogo lit'ia.** L. I. Levi. *Liteinoe Proizvodstvo*, 1956, no. 10, Oct. 1956, p. 1-5.

Method of introducing O into a cupola furnace through a forehearth and its advantages.

2681* (Russian.) Production of Overheated Cast Iron in a Magnesite-Lined Hot Blast Cupola. **Poluchenie peregretogo chuguna v vagranke s magnezitovoi futerovkoi pri podogreve dut'ia.** F. I. Smirnov. *Liteinoe Proizvodstvo*, 1956, no. 10, Oct. 1956, p. 10-13.

Method and construction details of preheating blast air by hot exhaust gases.

2682 Holding Close Tolerances on Die-Cast Parts. H. K. Barton and L. C. Barton. *Machinery*, v. 63, Dec. 1956, p. 182-188.

Causes of dimensional errors; checking for errors of alignment and concentricity; correction and inspection of die-cast parts; gaging fixture for an instrument frame; importance of realistic dimensioning; checking screw threads.

2683 Some Problems of Casting Removal From Die Casting Dies. E. N. Field. *Machinery (London)*, v. 89, Oct. 1956, p. 968-977.

Methods of anchoring castings; box type castings; compound ejection arrangement; production of deep castings on sheet-stroke machines; angular stripping; holding pins in large cores; captive die inserts.

2684* (Dutch.) Acid Cupola Linings. **De bekleding van de zure koepeloven.** A. Bordes. *Metaalinstituut T. N. O.*, 1956, no. 40, June 1956, 12 p. (TN603 M56p Contin.)

Practical data on raw materials, methods of patching and drying, wear of the lining, consumption of refractory material, and cost.

2685* (French.) Heating in Vacuum by Induction. **Le chauffage par induction sous vide.** A. Bussard. *Métallurgie et la Construction Mécanique*, v. 88, no. 10, Oct. 1956, p. 847-849, 851.

Present field of vacuum melting; designs; characteristics of melting furnaces with conducting or non-conducting crucible.

2686* Melting Metal With Sun-Power. D. C. Halacy, Jr. *Modern Castings*, v. 30, Dec. 1956, p. 28-29.

In the U. S., Convair uses the solar furnace in work with metals, "cer-mets", ceramics, ZrO_2, BN and other materials. General Electric purifies phosphors for use in communication equipment.

2687* How to Improve Foundry Layout. Roger B. Sinclair. *Modern Castings*, v. 30, Dec. 1956, p. 35-46.

Benefits of a good layout include labor costs, materials handling, flexibility, and economy. The way to plan a layout; methods of applying plans of the model.

2688* Choke That Gate. Charles V. Knobeloch. *Modern Castings*, v. 30, Dec. 1956, p. 48-50.

The proposed gating system in regulating metal flow in casting procedures should be as automatic in control functions as possible to eliminate variables. Methods and plans are presented.

2689* (Czech.) Properties of Molding Materials at Elevated Temperatures. **Vlastnosti formovačich látek za vyšších teplot.** Lev Petržela. *Slévárenství*, v. 4, no. 10; *Práce Československého Výzkumu Slévárenského*, v. 3, no. 36, Oct. 1956, p. 255-264.

Mold material failures are studied from 400 to 1200 C.

2690* (German.) Light Metal Casting. **Der Leichtmetallguss.** H. F. Frères. *VDI Zeitschrift*, v. 98, no. 31, Nov. 1956, p. 1770-1771.

Continuous die casting of finned pipes of pure Al of optional length.

2691* (Germany.) Progressive Casting and Molding Methods. **Fortschrittliche Giess und Formverfahren.** F. Polzguter. *VDI Zeitschrift*, v. 98, no. 31, Nov. 1956, p. 1772-1774.

Various German processes were studied such as the centrifugal casting method for pipes and barrels, the carbonic acid freezing method for compact molds, and precision casting.

See also: **1815** (alumina ladle linings); **1816** (zircon ladle linings); **2809** (rare earths in steel castings); **2949** (annealing of Pt); **2981** (heat treatment of aircraft parts); **3138** (plastic foundry patterns); **3211** (foundry ventilation equipment); **3212** (foundry ventilation equipment).

METALS—HEAT TREATMENT

2692* Some Aspects of Decarburisation. F. H. Robinson. *Australasian Engineer*, v. 48, Sept. 1956, p. 42-51.

Chemical and physical mechanism; occurrence and importance in medium carbon and tool steels; methods of detection, prevention, and estimation of depths of decarburized skins.

2693 Physical Principles of Electric Heating in an Electrolyte. I-II. Processes Developed for Heating (for Hardening) in an Electrolyte. I. Z. Yasnogorodskii. *Henry Brutcher Translation Nos.* 3204, 3205, 3210, and 3211, 11, 26, 18, and 18 p. (From *Heating of Metals and Alloys in an Electrolyte, Moscow,* 1949, Chap. 1, Sec. 1-5, Chap. 2, Sec. 1-4.) Henry Brutcher, Altadena, Calif.

Consists in treating the work to be heated as a cathode in an aqueous electrolyte at about 120 to 160 F with a d.c. of about 200 v.

2694* (Polish.) Decarburizing Steel Wire. **Odwęglenie drutów stalowych.** Jozef Pechański. *Hutnik,* v. 23, no. 9, Sept. 1956, p. 330-336.

Theory and mathematical analysis of the process; determination of the degree of decarburization. Effects of furnace atmosphere.

2695 Continuous Salt Bath Treatment Improves Farm Tools. *Industrial Heating,* v. 23, Nov. 1956, p. 2320 + 5 pages.

To minimize warpage and obtain optimum physical properties, tools are isothermally heat treated in a modern automatic electric salt bath installation.

2696 Simplified Heat Treatment of Piston Pins in Rotating Retort Furnace. R. E. Haislip. *Industrial Heating,* v. 23, Nov. 1956, p. 2333 + 5 pages.

Gas carburizing; rotating retort furnace; endothermic atmosphere; quality control.

2697 Flexible Batch Furnace Installation in Commercial Heat Treating Plant. Robert Grafmiller. *Industrial Heating,* v. 23, Nov. 1956, p. 2491 + 4 pages.

Economical, flexible installation; furnace operation; quenching control; atmosphere control.

2698* (French.) Low Alloy Heat Resistant Steels and Their Thermic Treatment. **Les aciers peu alliés résistant à chaud et leur traitement thermique.** G. Delbart and A. Constant. *Institut de Recherches de la Sidérurgie, Publications,* ser. A, no. 153, Oct. 1956, 16 p. (Reprinted from *Metaux-Corrosion-Industries,* no. 370, June 1956, p. 251-264.) (TN602 In7p Vis.)

These steels, used in aircraft industry and steam plants, receive various heat treatments. Influence of these treatments on creep; relation between creep and secondary hardening. Use is limited by low resistance to oxidation. Various coatings are possible.

2699 How Measurements Lead to Effective Quenching. Victor Paschkis and George Stolz, Jr. *Iron Age,* v. 178, Nov. 22, 1956, p. 95-97.

Studies on the effectiveness of an agitated quench, still water, and quenching in brine.

2700 Tunnel Annealing Furnace Speeds Stainless Parts Production. P. M. Unterweiser. *Iron Age,* v. 178, Dec. 6, 1956, p. 128-129.

New furnace provides a continuous, short cycle for annealing work-hardened TV-tube housings made of Type 430. It means a reduced scrap rate and can be handled by one operator.

2701 Controlled Atmospheres in Heat Treating. C. W. Sanzenbacher. *Iron and Steel Engineer,* v. 33, Nov. 1956, p. 71-76.

Types of prepared atmospheres; equipment required to generate them; applications in the steel industry.

2702 A Comparison of Single and Multiple Stack Annealing Furnaces. John Arnold. *Iron and Steel Engineer,* v. 33, Nov. 1956, p. 77-82.

Advantages of single stack operations include flexibility, lower installation costs, and lower product inventory.

2703 Induction Hardening Operations on Crankshafts. *Machinery (London),* v. 89, Nov. 16, 1956, p. 1122-1125.

Equipment and procedures.

2704 Nitriding Stainless Steels Costs Less in a Salt Bath. H. A. Johnson. *Materials & Methods,* v. 44, Nov. 1956, p. 113.

Salt composed of a mixture of carbonates and cyanides serves as the nitriding medium. Only degreasing and buffing are required to prepare the steel surfaces for nitriding.

2705* (Russian.) Improvements in the Annealing of Transformer Steel. **Usovershenstvovanie otzhiga transformatornoi stali.** N. F. Dubrov, G. A. Zykov, and V. A. Koroleva. *Metallurg,* 1956, no. 10, Oct. 1956, p. 27-28.

Suggests a redesign of the tunnel type furnace to secure a lower temperature gradient and a more uniform annealing along the height of piled transformer steel.

2706* (French.) Induction Tempering for More Wear Resistance in Heat Engines and Machines. **La trempe par induction comme moyen d'augmenter la résistance à l'usure dans les moteurs thermiques et les machines.** G. W. Seulen. *Métallurgie et la Construction Mécanique,* v. 88, no. 10, Oct. 1956, p. 823 + 6 pages.

Principles and effects of induction tempering; properties of steels suitable for tempering.

2707* (German.) Further Development of the End-Quench Test for Testing the Hardenability of Deep-Hardening Steels. **Weiterentwicklung des Stirnabschreckversuches zur Prüfung der Härtbarkeit von tiefer einhärtenden Stählen.** Adolf Rose and Leo Rademacher. *Stahl und Eisen,* v. 76, no. 23, Nov. 15, 1956, p. 1570-1573.

The above is related to the time-temperature transformation diagram for continuous cooling. Application to hot-working tool steels.

2708 Annealing With Superfast Cooling Option. Lester E. Alban and Harrold J. Bates. *Steel,* v. 139, Dec. 3, 1956, p. 150-152.

Cycle annealing furnace will continuously handle forgings in a wide assortment of sizes, shapes, and alloys.

2709 Control Measures for the Heat Treatment of High Carbon Rods and Wire. N. Dale Montgomery. *Wire and Wire Products,* v. 31, Nov. 1956, p. 1325-1326, 1390-1391.

Control measures instituted in annealing, patenting, and oil tempering operations.

See also: **2789** (quenching cracks in steel); **2910** (high-frequency tempering of steel); **2957** (nitriding of steel).

METALS—MECHANICAL AND PHYSICAL PROPERTIES

2710* The Temperature-Dependent and Temperature-Independent Parts of the Increase of Resistance Due to Impurities in a Metal. A Simple Method of Obtaining Their Ratio. A. N. Gerritsen and J. M. L. C. Van Der Aa. *Applied Scientific Research,* v. 6, sec. A, nos. 2-3, 1956, p. 191-196.

A linear relation between the average temperature coefficient of resistivity of a diluted alloy between 273 and 373 K and the residual resistance measured below 4 K gives a quantitative determination of the ratio between the temperature-dependent and temperature-independent parts of the increase of resistance of the base metal caused by alloying.

2711* (German.) Electron Microscope Studies of Fractured Steel Surfaces. **Elektronenmikroskopische Untersuchungen an Stahlbruchflächen.** Otto Werner and Johanna Hunger. *Archiv für das Eisenhüttenwesen,* v. 27, no. 10, Oct. 1956, p. 645-656.

Notch bending specimens of unalloyed structural steels were examined at time of receipt, in the normalized and aged state. Explanation of underlying structures on fractured surfaces of brittle broken crystallites.

2712 Scoring Characteristics of Thirty-Eight Different Elemental Metals in High-Speed Sliding Contact With Steel. A. E. Roach, C. L. Goodzeit, and R. P. Hunnicutt. *ASME, Transactions,* v. 78, Nov. 1956, p. 1659-1667.

2713 Frictional Characteristics and Surface Damage of Thirty-Nine Different Elemental Metals in Sliding Contact With Iron. C. L. Goodzeit, R. P. Hunnicutt, and A. E. Roach. *ASME, Transactions,* v. 78, Nov. 1956, p. 1669-1676.

Surface-damage characteristics are related to the relative hardness of the metals in sliding contact, their mutual solubility, and their ability to form intermetallic compounds.

2714 Behavior of Hard Chromium Deposits Under Cyclic Stress. I-II. A. A. Starosel'skii and D. N. Garkunov. *Henry Brutcher Translation Nos.* 3105 and 2954, 5 and 3 p. (From *Vestnik Mashinostroeniya,* v. 31, no. 3, 1951, p. 33-37; v. 32, no. 6, 1952, 55-56.) Henry Brutcher, Altadena, Calif.

Mechanical strength, nature of failure, and strength of bond between Cr deposit and basis metal. Description of failure of thin and heavy deposits.

2715 Study of Fatigue Strength of Shot Peened Specimens Under Stresses Exceeding the Fatigue Limit. M. Ya. Shashin. *Henry Brutcher Translation No.* 3145, 5 p. (From *Vestnik Mashinostroeniya*, v. 32, no. 9, 1952, p. 57-60.) Henry Brutcher, Altadena, Calif.

S-N curves representing non-strain hardened specimens and specimens strain hardened at different speeds of the stream and for different times. Optimum depth of strain hardening.

2716 Creep of Nodular Cast Iron. V. S. Ivanova and I. A. Oding. *Henry Brutcher Translation No.* 3767, 5 p. (From *Izvestiya Akademii Nauk SSSR, OTN*, 1955, no. 7, p. 89-92.) Henry Brutcher, Altadena, Calif.

Previously abstracted from original. See item 15179, v. 4, Dec. 1955.

2717* (English.) **Hardness of Spheroidal Graphite Cast Iron Containing Various Amounts of Ferrite.** Takaji Kusakawa and Toyoharu Kasai. *Castings Research Laboratory, Report, Waseda University*, 1956, no. 7, p. 7-12.

Rockwell and Brinell hardness is first increased, then decreased by addition of Si, and is rapidly increased by Mg treatment. Hardness of ferrite phase is higher than that in flake graphite Fe.

2718* (English.) **Study on High Strength Cast Iron.** Ichiro Iitaka and Kokichi Nakamura. *Castings Research Laboratory, Report, Waseda University*, 1956, no. 7, p. 13-15.

Relation between chemical compositions, strength, and hardness.

2719* (English.) **The Effects of Strain Rate and Temperature of the Mechanism of Metals to Compression.** Yuji Matsuura. *Castings Research Laboratory, Report, Waseda University*, 1956, no. 7, p. 51-54.

Compression tests on 99.99% Al.

2720* (English.) **Fatigue of Carbon Steel by Ultrasonic Flaw Detection Method.** Hiroshi Yamanouchi and Takeshi Inukai. *Castings Research Laboratory, Report, Waseda University*, 1956, no. 7, p. 55-58.

The values of the ultrasonic attenuation constant in mild steel under fatigue test vary with repeated stress intensity and stress cycle. These values increase in proportion to stress cycle, but a transition point exists on the curve.

2721* (English.) **Wear Properties of 60 : 40 Brass Containing Lead.** Fusao Hayama. *Castings Research Laboratory, Report, Waseda University*, 1956, no. 7, p. 81-82.

Variation of wear rate with speed, pressure, and lead content.

2722 Fatigue in Metals. P. G. Forrest. Paper from "Chemical Engineering Practice". v. II. Academic Press, p. 176-208 + 2 plates. (TP155 C42e)

Characteristics of fatigue failures; test methods and equipment; fatigue strength of metals; influence of stress conditions, size, surface finish, and temperature; corrosion fatigue.

2723 Creep in Metals. P. G. Forrest. Paper from "Chemical Engineering Practice". v. II. Academic Press, p. 209-241 + 1 plate. (TP155 C42e)

Characteristics and measurement of creep; presentation of creep data; creep strength of ferrous and non-ferrous metals; influence of metallurgical factors, stress, and corrosion.

2724* (French.) Measurement of the Hall Effect on Diamagnetic Palladium Metal Alloys. **Mesure de l'effet Hall sur des alliages palladium-métaux diamagnétiques.** Joseph Cohen. *Comptes Rendus*, v. 243, no. 16, Oct. 15, 1956, p. 1105-1107.

A measurement as close as 5% of the Hall effect was performed on these alloys and compared with the concentration of δ-electrons.

2725* (French.) A Certain Property of the Statistical Distribution of Life in Fatigue Resistance Tests. **Sur une proprieté des distributions statistiques des durées de vie à la fatigue.** François Bastenaire. *Comptes Rendus*, v. 243, no. 18, Oct. 29, 1956, p. 1270-1273.

The mathematical average or the variation observed in a sample are expressions with no statistical significance.

2726* (French.) Influence of a Magnetic Field on the Electrical Resistance of Thin Nickel Plates. **Influence d'un champ magnétique sur la résistance électrique des lames minces de nickel.** Thérèse Rappeneau. *Comptes Rendus*, v. 243, no. 19, Nov. 5, 1956, p. 1403-1406.

At room temperature, the electric resistance of thin evaporated Ni plates, under the influence of a magnetic field, decreases or increases according to the orientation of current-magnetization. In strong fields, the resistance decreases a little in both cases.

2727* Selecting Copper and Its Alloys. IV. Mechanical Properties. *Copper & Brass Bulletin*, 1956, no. 179, Nov. 1956, p. 8-9.

Strength data for cartridge brass, 70% and electrolytic tough pitch copper, hard temper. (To be continued.)

2728 Metallic Transfer in Engineering Operations. Radioactive Methods Used at Cambridge. F. P. Bowden and J. B. P. Williamson. *Engineering*, v. 182, Nov. 16, 1956, p. 619-621.

Whenever a metal is manipulated mechanically, small fragments of the tools used become torn out and embedded permanently in its surface. This form of contamination can have a profound effect on the subsequent behavior of the metal.

2729* (Russian.) Using Motion Pictures to Study the Dynamics of Domain Structure in the Crystals of Transformer Steel. **Issledovanie dinamiki domennoi struktury v kristallakh transformatornoi stali s primeneniem kinos'emki.** L. V. Kirenskii and V. D. Dylgerov. *Fizika Metallov i Metallovedenie*, v. 3, no. 2, 1956, p. 216-221.

A method of observing directly the qualitative and quantitative dynamics of domain structure as a function of field changes.

2730* (Russian.) The Relationship Between the Magnetic Inductance of Hot-Rolled Transformer Steel in Strong Field and the Thickness of the Sheets. **O zavisimosti magnitnoi induktsii goriachekatanoi transformatornoi stali v oblasti sil'nykh polei ot tolshchiny lista.** B. F. Trakhtenberg. *Fizika Metallov i Metallovedenie*, v. 3, no. 2, 1956, p. 222-228.

Reducing the thickness of polycrystalline ferromagnetic material reduces the value of the magnetic induction.

2731* (Russian.) Magnetic Properties of Chromium Steel SH X 15 After Different Heat Treatments. **Magnitnye svoistva khromistoi stali SH X 15 posle razlichnoi obrabotki.** M. N. Mikheev, I. A. Kuznetsov, V. A. Kriukova, and B. M. Neizvestnov. *Fizika Metallov i Metallovedenie*, v. 3, no. 2, 1956, p. 229-237.

Effects of temperature of tempering and annealing on the magnetic, electrical, and mechanical properties of the steel makes it possible to determine the mechanical properties by magnetic tests.

2732* (Russian.) The Energy of Hole Formation in Metals and Alloys. **Ob energii dyrkoobrazovaniia v metallakh i splavakh.** S. D. Gertsriken. *Fizika Metallov i Metallovedenie*, v. 3, no. 2, 1956, p. 238-241.

Claims a superior method of calculating the energy of hole formation in diffusion processes using the entire heat curve.

2733* (Russian.) Studies of Cohesive Forces in Iron-Molybdenum Solid Solutions From Fine Structure X-Ray Absorption Spectra. **Izuchenie sil sviazi v tverdykh rastvorakh zhelezo-molibden po tonkoi strukture rentgenovskykh spektrov pogloshcheniia.** V. A. Trapetsnikov and S. A. Nemnonov. *Fizika Metallov i Metallovedenie*, v. 3, no. 2, 1956, p. 314-320.

Alloying Fe with 2% Mo increases the cohesive forces; from 2 to 4% Mo there is no further change.

2734* (Russian.) The Elasticity and Plasticity Limits of Some Metals at the Temperature of Liquid Helium. **Predel uprugosti i plastichnosti nektorykh metallov pri temperture zhidkogo geliia.** V. I. Khotkevich. *Fizika Metallov i Metallovedenie*, v. 3, no. 2, 1956, p. 321-325.

Thallium, In, Hg, Pb, Cu, Mg, Al, Cd, Sn, Ag, Au, Pt, Ni, Mo, Ta, and Fe are still plastic at the temperature of liquid He. The electrical resistance of the metal was used to determine degree of plastic deformation of the specimen.

2735* (Russian.) The Effects of Frequency and Amplitude of Alternating Cyclic Torsion on the Maximum Plasticity of Metals and Certain Alloys. **Zavisimost' maksimal'noi plastichnosti metallov i nekotorykh splavov ot chastoty tsiklov i**

amplitudy deformatsii znako-peremennym krucheniem. F. P. Rybalko, G. V. Miroliubov, and N. N. Siutkin. *Fizika Metallov i Metallovedenie*, v. 3, no. 2, 1956, p. 341-348.

Maximum plasticity of Cu, Pb, Sn, brass, Zn, Al, and its Zn alloys decreases with the amplitude of the deformation. Increasing the frequency of the cycles increases the plasticity of the metals, while in the alloys it depends on the relationship of the components.

2736* (Russian.) The Size Effect in Studying Friction and Wear in Metals. **Masshtabnyi effekt pri issledovanii protsessa treniia i iznosa metallov.** V. I. Bondar'. *Fizika Metallov i Metallovedenie*, v. 3, no. 2, 1956, p. 363-368.

A study of factors to be considered when making wear and friction tests. Effects of changing shape and size of specimens on the results obtained.

2737* (Russian.) Wear Produced by Mutual Rubbing of Similar Metals. **Iznos pri vzaimnom trenii odnoimennykh metallov.** V. N. Kashcheev. *Fizika Metallov i Metallovedenie*, v. 3, no. 2, 1956, p. 369-373.

The body which reaches the higher temperature during the application of friction wears more slowly. The process is characterized by binding and the formation of a roughened surface.

2738* (Czech.) Strength Limits of Material. **Mezni stavy pevnosti materiálu.** Jaroslav Němec. *Hutnické Listy*, v. 11, no. 10, Oct. 1956, p. 583-592.

Shows the development of plastic and brittle fractures by means of the energy balance, and conditions which are responsible for their origin.

2739* (Polish.) The Effects of Wire Plasticity on the Fatigue Strength of Steel Wire Rope. **Wpływ plastycznych własności drutów na wytrzmałość zmęczeniowa lin.** Zygmunt Glowacki. *Hutnik*, v. 23, no. 9, Sept. 1956, p. 336-339.

Annealing steel wire after the last drawing operation improves the mechanical properties of the wire and the rope made of it.

2740 The Plastic Deformation of Aluminium and Aluminium Alloys. G. Thomas and J. Nutting. *Institute of Metals, Journal*, v. 85, Sept. 1956, p. 1-7.

Electron microscope was used to study metallography of slip in pure Al and Al alloyed with up to 7% Mg, 5% Ag, and 4% Cu.

2741 Some Observations on the Development of Face-Centred Cubic Rolling Textures. F. R. Braybrook and E. A. Calnan. *Institute of Metals, Journal*, v. 85, Sept. 1956, p. 11-14.

Measurements of Cu and α-brass indicate that, while the latter is consistent with deformation by slip on planes, an additional mechanism is operative in Cu.

2742 The Effect of High and Low Temperatures on the Notched-Bar Characteristics of a Cast, High-Tensile, Beta-Brass. A. R. Bailey, R. McDonald, and L. E. Samuels. *Institute of Metals, Journal*, v. 85, Sept. 1956, p. 25-29.

The Charpy figure was 28.5 ft.-lb., decreasing to 11 ft.-lb. at -195 C; fractures were transcrystalline in this range, although there was a small but significant tendency to intercrystalline cracking at room temperature, which gradually disappeared as the temperature of testing was lowered.

2743 The Relation During Creep Between Grain-Boundary Sliding, Sub-Crystal Size, and Extension. D. McLean and M. H. Farmer. *Institute of Metals, Journal*, v. 85, Oct. 1956, p. 41-50.

Grain-boundary sliding was found to be approximately proportional to elongation, a slight deviation occurring in the case of Cu. Relationship with subcrystal diameter was not confirmed.

2744 Some Experiments on the Determination of the Latent Heats of Transition of Titanium and Iron. T. H. Schofield. *Institute of Metals, Journal*, v. 85, Oct. 1956, p. 68-70.

Latent heats of the $\alpha \rightarrow \beta$ transition in Ti and the $\alpha \rightarrow \gamma$ transition in Fe were determined by a method which depends on the constancy of the products of the rates of heating and the times of transformation, and a knowledge of the specific heats.

2745 Calculation of the Contribution Made by Grain-Boundary Sliding to Total Tensile Elongation. H. Brunner and N. J. Grant. *Institute of Metals, Journal*, v. 85, Oct. 1956, p. 77-80.

Severe stress concentrations occur at the triple points whenever grain-boundry sliding takes place. An equation is derived which permits calculation of the elongation of a tensile specimen caused by sliding along any particular grain boundary.

2746* A Slip Line Field for the Hot Rolling Process. J. M. Alexander. *Institution of Mechanical Engineers, Proceedings*, v. 169, no. 50, 1955, p. 1021-1030.

A geometrical representation of the equations defining the flow in plane strain of a plastic rigid material facilitates adjustment, by inspection, of the slip line field until both velocity and stress boundary conditions are satisfied.

2747 International Conference on Fatigue of Metals, v. I-III. Papers individually paged. 1956. Institution of Mechanical Engineers, London, England. (TA460 In8p Over.)

Papers dealing with stress distribution; effects of temperature, frequency, and environment; metallurgical aspects of fatigue; basic mechanisms; and engineering and industrial significance of fatigue. Pertinent papers are individually abstracted.

2748 An Analysis of the Effects of Shot-Peening Upon the Fatigue Strength of Hardened and Tempered Spring Steel. A. G. H. Coombs, F. Sherratt, and J. A. Pope. Paper from "International Conference on Fatigue of Metals", v. I. Institution of Mechanical Engineers. 10 p. + 4 plates. (TA460 In8p Over.)

Effects of shot velocity, energy, and size on fatigue life.

2749 Cumulative Damage Under Random Loading. A. M. Freudenthal. Paper from "International Conference on Fatigue of Metals", v. I. Institution of Mechanical Engineers. 7 p. (TA460 In8p Over.)

Random fatigue testing machine; tests on 2024 and 7075 Al alloys.

2750 Cumulative Fatigue Damage. H. T. Corten and T. J. Dolan. Paper from "International Conference on Fatigue of Metals", v. I. Institution of Mechanical Engineers. 14 p. (TA460 In8p Over.)

A phenomenological hypothesis of fatigue damage, visualized as the nucleation of submicroscopic voids which develop into cracks, is given in terms of the numbers of damage nuclei and the rate of damage propagation.

2751 Damping and Resonant Fatigue Behaviour of Materials. B. J. Lazan. Paper from "International Conference on Fatigue of Metals." v. I. Institution of Mechanical Engineers. 14 p. (TA460 In8p Over.)

The general role of material damping in minimizing near-resonant fatigue stress is analyzed by developing criteria based on material properties and stress distribution for evaluating the resonant fatigue strength of parts.

2752 Effect of Large Hydrostatic Pressures on the Torsional Fatigue Strength of an Alloy Steel. B. Crossland. Paper from "International Conference on Fatigue of Metals", v. I. Institution of Mechanical Engineers. 14 p. (TA460 In8p Over.)

Fluid pressure has no effect on the stress-strain curve except to increase the strain to failure by about 80% at 20 tons per sq. in. pressure.

2753 The Effect of Mean Stress on the Fatigue of Aluminium Alloys. A. R. Woodward, K. W. Gunn, and G. Forrest. Paper from "International Conference on Fatigue of Metals", v. I. Institution of Mechanical Engineers. (TA460 In8p Over.)

Fatigue properties of seven alloys; stress-mean stress diagrams; application of several theories to behavior of the alloys tested.

2754 Effect of Unintentional Stress Raisers on the Fatigue Strength of Structural Components. E. C. Hartmann. Paper from "International Conference on Fatigue of Metals", v. I. Institution of Mechanical Engineers. 8 p. (TA460 In8p Over.)

The final effect of many unintentional discontinuities on the fatigue strength of finished parts is found to be entirely negligible.

2755 On the Endurance of Cast Iron and Steel Under Repeated Loading of Varying Amplitude. S. W. Serensen. Paper from "International Conference on Fatigue of Metals", v. I. Institution of Mechanical Engineers. 9 p. (TA460 In8p Over.)

Fatigue curves were statistically treated taking into account the large scattering of test data, and correlation equations between the stress amplitude and number of cycles were determined.

2756 Fatigue of Curved Surfaces in Contact Under Repeated Load Cycles. N. G. Kennedy. Paper from "International Conference on Fatigue of Metals". v. I. Institution of Mechanical Engineers. 10 p. + 4 plates. (TA460 In8p Over.)

Tests suggest that damage to the surface of curved elastic pairs in contact under cyclic loading stems from surface conditions at the boundary of the area of contact.

2757 Fatigue Strength in Shear of an Alloy Steel With Particular Reference to the Effect of Mean Stress and Directional Properties. W. T. Chodorowski. Paper from "International Conference on Fatigue of Metals". v. I. Institution of Mechanical Engineers. 12 p. + 2 plates. (TA460 In8p Over.)

Tests under torsional fatigue stresses on longitudinal oblique, and transverse specimens.

2758 Further Results of Fatigue Under Triaxial Stress. J. S. C. Parry. Paper from "International Conference on Fatigue of Metals". v. I. Institution of Mechanical Engineers. 8 p. (TA460 In8p Over.)

The low critical shear stress previously found for the fatigue limit for unprotected cylinders subjected to repeated internal pressures appears little affected by wide variation of triaxial tensile stress or fluid pressure. Strength can be raised by honing the bore after heat-treatment or by protecting the bore from the fluid by a thin film or rubber.

2759 Influence of Plastic Deformation on Notch Sensitivity in Fatigue. P. G. Forrest. Paper from "International Conference on Fatigue of Metals". v. I. Institution of Mechanical Engineers. 15 p. (TA460 In8p Over.)

The dynamic plastic strain per cycle varies during the course of a fatigue test for most of the materials investigated. Measurements afford no evidence that failure by fatigue is inseparably associated with plastic deformation.

2760 Influence of Residual Stresses on the Fatigue Limit. H. Sigwart. Paper from "International Conference on Fatigue of Metals". v. I. Institution of Mechanical Engineers. 12 p. (TA460 In8p Over.)

Nature of residual stresses including stresses due to local plastic deformations, unequal heating, and unequal stress distribution. Some examples of residual stresses. Effect of stresses on fatigue properties.

2761 Mechanical Aspects of Size Effect on Fatigue of Metals. G. V. Uzhik. Paper from "International Conference on Fatigue of Metals". v. I. Institution of Mechanical Engineers. 6 p. (TA460 In8p Over.)

Discontinuity of the material itself is not likely to decisively affect the fatigue strength under a size increase.

2762 Short Endurance Fatigue. A. C. Low. Paper from "International Conference on Fatigue of Metals". v. I. "Institution of Mechanical Engineers. 8 p. (TA460 In8p Over.)

For the five widely differing materials tested, with tensile strengths varying from 21 to 57 tons per sq. in., but all with good ductility, fatigue life in reversed bending was found to depend solely on the degree of strain, for maximum fiber strains between ± 0.4 and ± 5%.

2763 Stress Concentration in Relation to Fatigue. H. L. Cox. Paper from "International Conference on Fatigue of Metals". v. I. Institution of Mechanical Engineers. 12 p. + 2 plates. (TA460 In8p Over.)

The present state of knowledge of stress concentration in relation to needs of designer.

2764 The Basic Mechanism of Fatigue and Its Dependence on the Initial State of a Material. P. J. E. Frosyth. Paper from "International Conference on Fatigue of Metals". v. II. Institution of Mechanical Engineers. 5 p. + 2 plates. (TA460 In8p Over.)

The microscopic changes or damage which precede the formation of fatigue cracks and the changes which occur in the small volume of material at the tip of the crack when propagating are illustrated in pure and alloyed Al.

2765 The Behaviour of Single Crystals of Iron Under Fatigue Loading. H. A. Lipsitt and G. T. Horne. Paper from "International Conference on Fatigue of Metals". v. II. Institution of Mechanical Engineers. 9 p. + 2 plates. (TA460 In8p Over.)

The range of stresses which will cause fatigue failure in less than 2×10^7 cycles in single crystals of nominally pure Fe tested in axial tension-compression is very narrow. Deformation characteristics are similar to those in static tension, except that cross slip is more prevalent in fatigue.

2766 The Distinction Between Initiation and Propagation of a Fatigue Crack. John A. Bennett. Paper from "International Conference on Fatigue of Metals". v. II. Institution of Mechanical Engineers. 5 p. + 3 plates. (TA460 In8p Over.)

Distinction may be difficult to make when the cracks are small, and any nondestructive method for identifying cracks should be verified by metallographic examination of sections cut through the questionable markings.

2767 Effect of Fatigue Stresses on Creep and Recovery. A. J. Kennedy. Paper from "International Conference on Fatigue of Metals". v. II. Institution of Mechanical Engineers. 9 p. (TA460 In8p Over.)

Creep of Pb under static stress with superimposed fatigue stresses. Effect of a fatigue vibration on the recovery properties of work-hardened metals.

2768 Experiments Relating to the Basic Mechanism of Fatigue. N. Thompson. Paper from "International Conference on Fatigue of Metals". v. II. Institution of Mechanical Engineers. 6 p. + 4 plates. (TA460 In8p Over.)

Stages in the development of a fatigue crack in a single crystal of Cu and in polycrystalline Ni.

2769 Failure of Metals Under Cyclic Strain. W. A. Wood. Paper from "International Conference on Fatigue of Metals". v. II. Institution of Mechanical Engineers. 6 p. (TA460 In8p Over.)

An interpretation of the fatigue property is based on study of the structural changes peculiar to fatigue.

2770 The Fatigue Behaviour of Iron With Intergranular Weakness. H. R. Tipler and P. G. Forrest. Paper from "International Conference on Fatigue of Metals". v. II. Institution of Mechanical Engineers. 5 p. (TA460 In8p Over.)

Tests reveal an unusual type of fatigue failure in Fe having exceptionally weak grain boundaries.

2771 Fatigue Endurance of Large Parts With Electro-Slag Welds. E. P. Unksov. Paper from "International Conference on Fatigue of Metals". v. III. Institution of Mechanical Engineers. 8 p. + 4 plates. (TA460 In8p Over.)

Fatigue endurance of welded joint without heat treatment and with reinforcement left intact is lower than that of unwelded samples. Heat treatment increased endurance by 30 to 35%. Mechanical treatment with no reinforcement was extremely favorable.

2772 Fatigue of Metals Under Contact Friction. I. A. Oding and V. S. Ivanova. Paper from "International Conference on Fatigue of Metals". v. II. Institution of Mechanical Engineers. 8 p. (TA460 In8p Over.)

Reduction in fatigue limit in conditions of contact friction can be explained by the process of electric erosion that proceeds under the action of a thermoelectric current produced as a result of friction, and which pulsates in magnitude because of a variation in the resistance of the contact.

2773 The Fatigue Problem in Welded Construction. R. Weck. Paper from "International Conference on Fatigue of Metals". v. III. Institution of Mechanical Engineers. 11 p. + 4 plates. (TA460 In8p Over.)

Some general considerations; fatigue in welds and joints; metallurgical aspects and welding processes; residual stresses; service experience and failures.

2774 Fatigue Properties of Some Non-Ferrous Metals Excluding Light Alloys. J. McKeown. Paper from "International Conference on Fatigue of Metals". v. II. Institution of Mechanical Engineers. 9 p. (TA460 In8p Over.)

Lead and Pb alloys; Cu and its alloys; metals for sleeve bearings; coating metals.

2775 Fatigue Properties of Steel at High Temperatures. F. Wever. Paper from "International Conference on Fatigue of Metals". v. II. Institution of Mechanical Engineers. 7 p. + 2 plates. (TA460 In8p Over.)

Fatigue strength and mean stress; stress fracture times for static and alternating loading; notch effect and surface hardening; metallographical investigations.

2776 Fatigue, Residual Stresses and Surface Cold Working. R. L. Mattson. Paper from "International Conference on Fatigue of Metals". v. III. Institution of Mechanical Engineers. 13 p. + 2 plates. (TA460 In8p Over.)

Experimental data illustrate the importance of these problems.

2777 Fatigue Testing of Compression-Type Coil Springs. R. C. Coates and J. A. Pope. Paper from "International Conference on Fatigue of Metals". v. III. Institution of Mechanical Engineers. 15 p. (TA460 In8p Over.)

Spring fatigue testing machines. Effects of shot-peening, scragging, scragging and peening, and mean stress.

2778 Fatigue Tests on Seamless Mild-Steel Pipe Bends. P. H. R. Lane. Paper from "International Conference on Fatigue of Metals". v. III. Institution of Mechanical Engineers. 10 p. +2 plates. (TA460 In8p Over.)

Specimens were subjected to pulsating internal pressure and to alternating external loading in the plane of the bend.

2779 Fatigue of Wrought High-Tensile Alloy Steels. P. H. Frith. Paper from "International Conference on Fatigue of Metals". v. II. Institution of Mechanical Engineers. 41 p. (TA460 In8p Over.)

Includes 287 fatigue results for various types or combinations of reversed stress.

2780 The Growth of Fatigue Cracks Under Plastic Torsion. F. A. McClintock. Paper from "International Conference on Fatigue of Metals". v. II. Institution of Mechanical Engineers. 7 p. 2 plates. (TA460 In8p Over.)

Theoretical analysis and experiments with an Al alloy.

2781 Hardness Changes During Fatigue Tests on Copper. R. B. Davies, J. Y. Mann, and D. S. Kemsley. Paper from "International Conference on Fatigue of Metals". v. II. Institution of Mechanical Engineers. 8 p. (TA460 In8p Over.)

Progressive hardness changes during fatigue; hardness traverses along fractured specimens; metallographic examination.

2782 Hydrogen Occlusion and Its Effect on the Fatigue Properties of Plain Carbon Spring Steels. J. S. Jackson. Paper from "International Conference on Fatigue of Metals". v. II. Institution of Mechanical Engineers. 8 p. (TA460 In8p Over.)

Conditions of steel which tend to lower the ductility are more prone to the damaging effects of H occlusion. Occluded H has very little effect on the fatigue limit of cold-worked spring steels but can cause a marked falling off in resistance to fatigue at stress ranges above the fatigue limit.

2783 The Influence of Frequency of Vibration on the Endurance Limit of Ferrous Alloys at Speeds up to 150,000 Cycles per Minute Using a Pneumatic Resonance System. T. W. Lomas, J. O. Ward, J. R. Rait, and E. W. Colbeck. Paper from "International Conference on Fatigue of Metals". v. II. Institution of Mechanical Engineers. 13 p. (TA460 In8p Over.)

There is a definite influence of frequency on the endurance limit of a wide range of materials when tested in resonance. The pneumatic technique appears to be very sensitive to notches.

2784 The Influence of Some Surfaces Factors on the Torsional Fatigue Strength of Spring Steels. J. F. Watkinson. Paper from "International Conference on Fatigue of Metals". v. II. Institution of Mechanical Engineers. 16 p. + 4 plates. (TA460 In8p Over.)

Shot-peening improves the fatigue strength of quenched and tempered spring steel in both the polished and the head-treated conditions. Decarburization reduces the residual stresses present after peening and markedly reduces the fatigue strength of the shot-peened specimens.

2785 The Influence of Temperature on the Fatigue of Metals. N. P. Allen and P. G. Forrest. Paper from "International Conference on Fatigue of Metals". v. II. Institution of Mechanical Engineers. 16 p. + 3 plates. (TA460 In8p Over.)

Effect of Cu, mild steel, and some technical creep-resisting alloys; fatigue under fluctuating stresses at high temperature; correlation of creep strength and fatigue strength; influence of metallographic structure and corrosion.

2786 The Reactions of High-Strength Aluminium Alloys to Alternating Stresses. R. F. Hanstock. Paper from "International Conference on Fatigue of Metals". v. II. Institution of Mechanical Engineers. 9 p. + 2 plates. (TA460 In8p Over.)

The fatigue process; dynamic properties of Al alloys; nature of the changes in hysteresis induced by prolonged cyclic stresses; differences between the effects of thermal treatment and cyclic stressing; precipitation produced by cyclic stressing.

2787 Relation of Inclusions to the Fatigue Properties of High-Strength Steels. F. B. Stulen, H. N. Cummings, and W. C. Schulte. Paper from "International Conference on Fatigue of Metals". v. II. Institution of Mechanical Engineers. 8 p. (TA460 In8p Over.)

Fatigue life and strength of high-strength steels, heat-treated to a given ultimate tensile strength, depend largely on the size and location of inclusions.

2788 Some Preliminary Fatigue Results on a Steel of Up to 800 V. P. N. Hardness Using Notched and Unnotched Specimens. J. E. Russell and D. V. Walker. Paper from "International Conference on Fatigue of Metals". v. II. Institution of Mechanical Engineers. 5 p . (TA460 In8p Over.)

There is no confirmation of the theory that low fatigue ratios for very high tensile steel are due to lower tempering temperature. No significant improvement in fatigue properties is noted for C contents above 0.5%. Tendency of notch susceptibility to fall with increasing hardness above 400 V.P.N. is confirmed.

2789 Strength Reduction Factors for Small Quenching Cracks and for Decarburized Steel. J. A. Pope and C. W. Barson. Paper from "International Conference on Fatigue of Metals". v. II. Institution of Mechanical Engineers. 8 p. + 2 plates. (TA460 In8p Over.)

Heavy decarburization is more detrimental to the fatigue strength of the Si-Mn steel tested than the small quenching cracks induced. Overstrain has no beneficial effect upon the quenching cracks.

2790 Studies in the Formation and Propagation of Cracks in Fatigue Specimens. N. E. Frost and C. E. Phillips. Paper from "International Conference on Fatigue of Metals". v. II. Institution of Mechanical Engineers. 9 p. + 4 plates. (TA460 In8p Over.)

The existence and formation of non-propagating cracks in notched specimens subject to fatigue loading; conditions necessary to form non-propagating cracks and their effects on notch sensitivity; strength reduction factors of cracks; crack propagation.

2791 A Study of the Strain Cycling and Fatigue Behaviour of a Cold-Worked Metal. L. F. Coffin and J. H. Read. Paper from "International Conference on Fatigue of Metals". v. II. Institution of Mechanical Engineers. 12 p. (TA460 In8p Over.)

The strain softening of AISI-347 stainless steel is examined as a function of two of the more important variables the degree of prior cold work and temperature.

2792 Very High-Speed Fatigue Testing. A. R. Wade and P. Grootehuis. Paper from "International Conference on Fatigue of Metals". v. II. Institution of Mechanical Engineers. 11 p. (TA460 In8p Over.)

Choice of type of high-speed machine; calculation of stress; fatigue tests.

2793 Interpretation of Creep Data. J. H. M. Draper. *Iron & Steel*, v. 29, Nov. 1956, p. 511-516.

A general picture of the different types of creep data.

2794* (Swedish.) Brittle Fractures in Mild Steel. **Spröda brott i mjuka stål.** Per Matton Sjöberg. *Jernkontorets Annaler*, v. 140, no. 10, 1956, p. 759-811.

Influence of the critical strain acceleration on cleavage of ferrite. Impact tests at low energy levels. Initiation and propagation of brittle fracture. Relationship between crack propagation and elastic-plastic wave propagation. Influence of residual stresses, analysis, and microstructure.

2795 Propagation of Cleavage Cracks in Crystals. John J. Gilman. *Journal of Applied Physics*, v. 27, Nov. 1956, p. 1262-1269.

Data on crack propagation in elastic media. For inelastic media, it is postulated that two critical velocity conditions must be satisfied or crack propagation cannot occur.

2796 Quantitative Study of Substructure Characteristics and Correlation to Tensile-Property of Nickel and Nickel Alloy. Sigmund Weissmann. *Journal of Applied Physics*, v. 27, Nov. 1956, p. 1335-1344.

Application of a method combining X-ray microscopy and diffraction analysis disclosed the coexistence of three orders of magnitude of substructural entities. These three orders are structurally interrelated and distinguished by different ranges of size, disorientation angle, and lattice misalignment.

2797 A New Approach to Hot Tearing. C. F. Christopher. *Journal of Metals*, v. 8, Dec. 1956, p. 1654-1657.

Impact tests and microscopic examination show that the hot tearing tendency exists in a narrow temperature range and is primarily effected by the heterogeneous freezing point of the metals.

2798* (Hungarian.) Fatigue Tests of Aluminum Alloys and Their Welded Joints. **Alumíniumötvözetek és azok hegesztett kötéseinek fárasztó vizsgálata.** István Varga. *Kohászati Lapok*, v. 11, no. 8, Aug. 1956, p. 377-380.

Factors effecting fatigue. Conclusions concerning optimum welding materials.

2799* (Russian.) Hardness and Microhardness of Ferritic Cast Iron. **Tverdost' i mikrotverdost' ferritnogo chuguna.** K. I. Vashchenko, R. P. Todorov, and P. A. Varenik. *Liteinoe Proizvodstvo*, 1956, no. 10, Oct. 1956, p. 19-23.

Investigation of hardness of gray and Mn cast irons, and Si steel.

2800 The Influence of Design on Stress Concentration and Fatigue Failure. A. G. Gardner. *Machinery (London)*, v. 89, Nov. 1956, p. 1061-1066.

Determination of fatigue or endurance strength; causes and alleviation of stress concentration; heat treatment stresses due to design; effect of shape on cooling speed.

2801 (Dutch.) Symposium on Testing Machines. **Symposium over vermoeiing. II.** Fatigue Testing Machines. **Vermoeiingstoestellen.** G. M. Canta. *Metaalinstituut T. N. O.*, 1956, no. 45, Oct. 1956, 7 p. (TN603 M56p Contin.)

Characteristics of three types of machines are presented.

2802* (Dutch.) A Kinematic Picture of Fracture. **Het kinematische beeld van het breukverschijnsel.** J. Leeuwerik. *Metalen*, v. 11, no. 20, Oct. 1956, p. 446-450.

Description of the mechanism of fracture with ultrasonic shock waves, while traces were formed by transverse waves, in polymethylmethacrylates, glass, and quartz.

2803* (Dutch.) A Theoretical Interpretation of Fracture. **Theoretische interpretatie van het breukverschijnsel.** F. Schwarzl. *Metalen*, v. 11, no. 21, Nov. 1956, p. 470-476.

Fracture in metal was studied in relation to the order of magnitude of the ultimate stress and cohesion-energy, the influence of non-homogeneous factors on strength, the statistical character of the ultimate stress, and time.

2804* (German.) Long-Time Creep Properties of Pure and Low-Alloyed Copper. **Das Zeitstandverhalten des reinen und niedriglegierten Kupfers.** H. Vosskühler. *Metall*, v. 10, nos. 21-22, Nov. 1956, p. 1020-1022.

Data for various Cu alloys.

2805* (German.) Hardening and Recrystallization of Copper-Cobalt and Copper-Manganese-Cobalt Alloys With High Copper Content. **Zur Aushärtung und Rekristallisation kupferreicher Kupfer-Kobalt-und Kupfer-Mangan-Kobalt-Legierungen.** K. L. Dreyer and J. Geissler. *Metall*, v. 10, nos. 21-22, Nov. 1956, p. 1028-1033.

Investigation of above by measuring Vickers hardness and electric resistance at low temperature and at temperatures of 500 to 600 C.

2806* (Russian.) On the Nature of the Reversible Temper Brittleness in Structural Steels. **O prirode obratimoi otpusknoi khrupkosti konstruktsionnoi stali.** S. F. Iur'ev. *Metallovedenie i Obrabotka Metallov*, 1956, no. 10, Oct. 1956, p. 37-51 + 2 plates.

Principal features of reversible temper brittleness in structural steels, intergranular development of the process, and its kinetic properties in a single chilled steel tempering.

2807* (Russian.) The Effect of Deformation Rate on the Ductility of Hardened Steel. **Vliianie skorosti deformatsii na plastichnost' zakalennoi stali.** S. S. Shurakov. *Metallovedenie i Obrabotka Metallov*, 1956, no. 10, Oct. 1956, p. 57-63.

Tests performed on steel Z x 13 and 12 x 2 H_4A, shows that ductility in hardened steels increases with a higher rate of deformation; brittleness is lessened.

2808* A Preliminary Study of the Fatigue of Metals in Liquid Metal Environments. J. W. Martin and G. C. Smith. *Metallurgia*, v. 54, no. 325, Nov. 1956, p. 227-232, 238.

Results of fatigue tests at room temperature on amalgamated Cu alloys, and at 300 C on mild and stainless steel in contact with liquid Sn and liquid Na, respectively.

2809* Rare Earths in Steel Castings. W. J. Jackson. *Metallurgia*, v. 54, no. 325, Nov. 1956, p. 233-238.

Rare-earth additions improve ductility and impact properties, reduce susceptibility to hot tearing, and increase fluidity. Both hardenability and weldability appear to be unaffected.

2810* (French.) Tensile Testing of Aluminum Alloy Castings Using Standardized Specimens on the Chevenard Micromachine. **Standardisation et emploi des éprouvettes de traction pour micromachine Chevenard, destinées au contrôle des pièces moulées en alliages d'aluminium.** C. Mascré. *Métaux, Corrosion-Industries*, v. 31, no. 374, Oct. 1956, p. 385-395.

Two types of tensile test specimens were proposed for standardization and comparison with classic specimens, and some mechanical characteristics of castings were examined.

2811* (Russian.) Effect of Insoluble Inclusions on the Viscosity of Melted Metals During Supercooling. **Vliianie nerastvorimykh primesei na viazkost' rasplavlennykh metallov pri pereokhlazhdenii.** G. I. Goriaga and E. G. Shvidkovskii. *Moskovskogo, Universiteta, Vestnik, Seriia Fiziko-Matematicheskikh i Estestvennykh Nauk*, v. 11, no. 6, June 1956, p. 33-37.

Effect of amount of inclusions and related structural changes. Heterogeneous system and viscosity.

2812 (Dutch.) Tensile and Time-to-Fracture Tests on Redux Bonded 75 S-T Clad Single Lap Joints at Temperatures Ranging From Room Temperature to 80 C. **De treksterkte en de lange-duursterkte van met Redux gelijmde 75 S-T clad enkelvoudige lapnaden tussen kamertemperatuur en 80°C.** A. Hartman. *Nationaal Luchtvaartlaboratorium, Rapport* NLL-TNM 2009, June 1956, 50 p. (TL526.N3 N38.5r Contin.)

Describes a check on the curing of the adhesive; tensile and long-term strengths are similar to increasing temperature.

2813 (English.) **The Fatigue Strength at Fluctuating Tension of Single Lap Joints of Clad 24 S-T and 75 S-T Aluminum Alloys With 2 Rows of 17 S Rivets.** A. Hartman and W. Klaassen. *Nationaal Luchtvaartlaboratorium, Rapport* NLL-TNM 2011, July 1956. (TL526.N3 N38.5r Contin.)

Fatigue strength of the 24 S-T alclad sheet was superior.

2814 Creep of Alpha Uranium During Irradiation With Neutrons. A. C. Roberts and A. H. Cottrell. *Philosophical Magazine*, v. 1, ser. 8, no. 8, Aug. 1956, p. 711-717.

Effect is predicted as a consequence of "radiation-growth" which occurs in U, and is then confirmed by creep experiments on helical springs of natural U.

2815 The Thermal and Electrical Conductivity of Lithium at Low Temperatures. H. M. Rosenberg. *Philosophical Magazine*, v. 1, ser. 8, no. 8, Aug. 1956, p. 738-746.

At the lowest temperatures the ideal electrical resistivity is found to vary. Results are compared with current theories.

2816 The Thermal Expansion of Aluminium at Low Temperatures as Measured by an X-Ray Diffraction Method. B. F. Figgins, G. O. Jones, and D. P. Riley. *Philosophical Magazine*, v. 1, ser. 8, no. 8, Aug. 1956, p. 747-758.

Accurate determination of lattice cell dimensions. Results represent a tendency for the Grüneisen constant to increase at the lowest temperatures.

2817 The Mechanism of Work Softening in Aluminium. Anthony Kelly. *Philosophical Magazine*, v. 1, ser. 8, no. 9, Sept. 1956, p. 835-845.

Crystals strained at one temperature and subsequently deformed at a higher temperature show a yield point (work softening); this is accompanied by an increase in the amount of cross slip and in the intensity of cross slip tracers.

2818 Electrical and Thermal Magneto-Resistance in Thin Rods of Pure Sodium. G. K. White and S. B. Woods. *Philosophical Magazine*, v. 1, ser. 8, no. 9, Sept. 1956, p. 846-853.

Measurements are reported on the resistivity of 130 and 350μ diameter rods of high purity Na in transverse magnetic fields (0 to 10,000 oersteds) and at temperatures between 2 and 18 K.

2819 The Specific Heats of Cadmium and Mercury. P. L. Smith and N. M. Wolcott. *Philosophical Magazine*, v. 1, ser. 8, no. 9, Sept. 1956, p. 854-865.

Measurements at 1.3 to 20 K.

2820 Low Temperature Release of Stored Energy in Cold Worked Copper. J. W. Henderson and J. S. Koehler. *Physical Review*, v. 104, ser. 2, Nov. 1, 1956, p. 626-633.

Pure polycrystalline Cu and α-brass specimens were deformed in compression at temperatures near 185 C. Stored energy release during warmup was measured as function of temperature.

2821 Magnetic Domains in Evaporated Thin Films of Nickel-Iron. Charles A. Fowler, Jr., Edward M. Fryer, and John R. Stevens. *Physical Review*, v. 104, ser. 2, Nov. 1, 1956, p. 645-649.

In a series of six films ranging in thickness from 20,000 to 500 A, domain patterns were photographed in all but the two thickest.

2822 Piezoresistance in Bismuth. R. W. Keyes. *Physical Review*, v. 104, ser. 2, Nov. 1, 1956, p. 665-666.

Piezoresistance phenomena are consistent with some of the multivalley models of Bi previously proposed.

2823* Residual Resistivity vs. Short-Range Order in Cu_3Au. A. C. Damask. *Physics and Chemistry of Solids*, v. 1, Sept.-Oct. 1956, p. 23-26.

Resistivity increases with increasing short-range order.

2824* The Effect of Short-Range Order on Residual Resistivity. John B. Gibson. *Physics and Chemistry of Solids*, v. 1, Sept.-Oct. 1956, p. 27-34.

A general theory, based on the Nordheim approximation, for the residual resistivity of binary solid solutions with short-range order but no long-range order. Application to Cu_3Au and α brass.

2825* The Electronic Properties of Nickel-Palladium Alloys. E. P. Wohlfarth. *Physics and Chemistry of Solids*, v. 1, Sept.-Oct. 1956, p. 35-38.

Available magnetic data are analyzed. A series of further experimental investigations is suggested.

2826* Preliminary Electrical-Resistivity Measurements of the Nickel-Palladium Alloy System. A. I. Schindler, R. J. Smith, and E. I. Salkovitz. *Physics and Chemistry of Solids*, v. 1, Sept.-Oct. 1956, p. 39-41.

Resistivity reaches a maximum at approximately 70 at.% Pd at 4.2, 77, and 300 K. Shift of the maximum from the 50-50 composition appears to be due to an *s-d* scattering component which increases with Pd content and persists down to liquid-helium temperatures.

2827* Resistance and Paramagnetism at the Superconducting Transition. James C. Thompson. *Physics and Chemistry of Solids*, v. 1, Sept.-Oct. 1956, p. 61-64.

Experiments on the longitudinal magnetization and resistance of In rods at the superconducting transition under equilibrium conditions of large current, small magnetic field, and constant temperature.

2828 Modified Theories of Fatigue Failure Under Combined Stress. W. N. Findley and P. N. Mathur. Paper from "Proceedings of the Society for Experimental Stress Analysis", v. XIV. No. 1. p. 35-46. (TG265 So13p Vis.)

Several proposed theories were modified to account for anisotropy and state of stress, and were examined in the light of existing data.

2829 Fatigue Damage Measured by Deflections of Rotating Beam Specimens. R. G. Crum and E. D'Appolonia. Paper from "Proceedings of the Society for Experimental Stress Analysis", v. XIV. No. 1. p. 71-82. (TG265 So13p Vis.)

Construction and use of apparatus for continuously recording the mid-span deflection and the energy dissipated during cyclic loading of rotating beam fatigue specimens tested at various speeds.

2830 A Fatigue Testing Machine for Reversed Bending and Steady Torque. H. H. Mabie and M. S. Gjesdahl. Paper from "Proceedings of the Society for Experimental Stress Analysis", v. XIV. No. 1, p. 83-88. (TG265 So13p Vis.)

Machine design; tests on triangular and square shafts with rounded corners, and on round shafts with keyways.

2831* (German.) Experimental Data and Suggestions for Impact Testing. **Erfahrungen und Anregungen zum Schlagversuch.** W. Spath. *Radex Rundschau*, 1956, no. 7, Oct. 1956, p. 327-333.

Designs and impact diagram from simultaneous measurement of the impact energy and the maximum stress.

2832* (Japanese.) **On the Characteristics of Al-Zn Galvanic Anode.** Hayata Shigeno and Hideo Togano. *Reports of the Government Chemical Industrial Research Institute, Tokyo*, v. 51, no. 10, Oct. 1956, p. 373-380.

2833 The Thermal Expansion of Pure Metals and the Possibility of Negative Coefficients of Volume Expansion. J. H. O. Varley. *Royal Society, Proceedings*, v. 237, ser. A, Nov. 6, 1956, p. 413-421.

Factors controlling the volume thermal expansion of solids. The negative coefficient of volume expansion of the cubic phase in Pu.

2834 The Fundamental Slip Process in the Torsion of a Crystal Having a Single Active Slip Plane. A. D. Whapham and H. Wilman. *Royal Society, Proceedings*, v. 237, ser. A, Nov. 20, 1956, p. 513-529 + 2 plates.

The main deformation process in the torsion of cyclindrical Zn crystals consists of flexural rotational slip on (0001), when ϕ is up to 62° and probably more. This accounts for the observed saddle-like shape of the slip lamellae, and the rounded-triangular cross-section developed by the rod.

2835* (German.) Method of Long-Time Creep Test in Furnace With Small Size Rods. **Durchführung von Zeitstandversuchen im Vielstabofen mit kleiner Stabform.** W. Stauffer and A. Keller. *Schweizer Archiv für Angewandte Wissenschaft und Technik*, v. 22, no. 10, Oct. 1956, p. 319-333.

Method of carrying out long-time stress rupture tests which are more reliable than short-time fatigue tests.

2836 Stretch-Forming of Aluminium and Its Alloys. R. D. Edwards. *Sheet Metal Industries*, v. 33, no. 355, Nov. 1956, p. 759-769, 774.

Theory of the process, machines, and methods used in the aircraft industry.

2837 Bending by Rolling of Ferrous and Non-Ferrous Plate and Sheet. *Sheet Metal Industries*, v. 33, no. 355, Nov. 1956, p. 813-817.

A survey of the various machines employed, their characteristics, and mode of operation. (To be continued.)

2838* (Russian.) Hydrogen Effect on Mechanical Properties of Steel. **Vliianie vodoroda na mekhanicheskie svoistva stali.** P. V. Skiuev, L. I. Kvater, and V. E. Shapiro. *Stal'*, v. 16, no. 10, Oct. 1956, p. 909-915.

The effect of H on plasticity and ductility of steel in relation to its chemical composition, strength, structure, and testing temperature.

2839* (Russian.) The Problem of Laminated Woody Fracture. **K voprosu o shifernom izlome.** I. S. Kaptiug. *Stal'*, v. 16, no. 11, Nov. 1956, p. 1021-1025.

A critique of the works of several authors on the subject, citing errors made, and some of the criteria for a correct evaluation.

2840* (German.) Investigation of the Surface Structure Effect on Vibrational Fatigue Limit of Metal Parts. **Untersuchungen über den einfluss der oberflächenbeschaffenheit auf die Dauerschwingfestigkeit metallischer Bauteile.** E. Siebel and M. Gaier. *VDI Zeitschrift*, v. 98, no. 30, Oct. 1956, p. 1715-1723.

Effect of roughness depth and stress distribution for various materials. Suggestion for consideration of the roughness degree in strength calculation.

2841* (Russian.) Chemical Analysis of Surface Layers of Metals Exposed to Various Types of Wear. **Khimicheskii analiz poverkhnostnykh sloev metalla pri raznykh vidakh iznashivaniia.** B. I. Kostetskii, N. L. Golego, and P. K. Topekha. *Vestnik Mashinostroeniia*, v. 36, no. 10, Oct. 1956, p. 25-26.

The role of O in the hard, white surface formations of steel exposed to certain friction conditions.

2842* (Russian.) Mechanical Properties of Steel After Impregnating Its Surface With Chromium. **Mekhanicheskie svoistva stali Posle nasyshcheniia poverkhnosti chromom.** G. N. Dubinin. *Vestnik Mashinostroeniia*, v. 36, no. 10, Oct. 1956, p. 56-58.

Chrome plating steel increases its long-time strength 40 to 50 times and increases fatigue strength at high temperatures.

2843 Effect of Temperature on the Fracturing Behavior of Mild Steel. J. D. Lubahn. *Welding Journal*, v. 35, Nov. 1956, p. 557S-568S.

Strength, energy-absorbing capacity, ductility, and amount of gradual tearing preceding brittle crack propagation by cleavage are among the fracture properties observed at various temperatures.

2844* (Russian.) Methods of Determining Tensile Strength of Ductile Metals. **K metodike opredeleniia soprotivleniia otryvu plastichnykh metallov.** Iu. I. Likhachev. *Zavodskaia Laboratoriia*, v. 22, no. 10, Oct. 1956, p. 1209-1217.

Comparison of experimental and calculated results. Tensile strength of circumferentially notched cylindrical specimens with prior low-temperature local plastic deformation.

2845* (Russian.) Method of Recording True Compressive-Strength Curves of a Metal. **Netod zapisi istinnykh krivykh soprotivleniia metalla szhatiiu.** G. E. Arkulis. *Zavodskaia Laboratoriia*, v. 22, no. 10, Oct. 1956, p. 1217-1220.

Describes compression-testing equipment and compares calculated and indicated values.

2846* (Russian.) Machine for Fatigue Testing of Coiled Cylindrical Springs and Wire. **Mashina dlia ispytaniia vitykh tsilindricheskikh pruzhin i provoloki na ustalost'.** D. A. Sveshnikov and G. P. Maslennikov. *Zavodskaia Laboratoriia*, v. 22, no. 10, Oct. 1956, p. 1245-1247.

Design and operation of the apparatus and interpretation of results.

2847* (German.) Stress Field of a Concentrated Load at the End of an Infinite Plate With an Elastic Anisotropy. **Spannungsfeld einer auf den Rand einer Halbebene wirkenden Einzellast bei elastischer Anisotropie.** Hans H. Stadelmaier. *Zeitschrift für Angewandte Mathematik und Physik*, v. 7, no. 5, Sept. 1956, p. 393-402.

Periodic loading effects are discussed and compared with an existing observation of a non-uniform stress distribution in α-iron.

2848* (German.) Texture and Magnetization Curve in Ferrosilicon. **Textur und Magnetisierungskurve bei Siliziumeisen.** Dieter Ganz and Robert Brenner. *Zeitschrift für Angewandte Physik*, v. 8, no. 10, Oct. 1956, p. 502-505.

An explanation of the difference between the magnetization curves obtained from long masses of ferrosilicon and the single crystal curves.

2849* (German.) Determination of Residual Stress in Aluminum, Silumin, and Brass Hollow Cylinders After Expansion. **Bestimmung der Eigenspannungszustände in Hohzylindern aus Aluminium, Silumin und Messing nach der Aufweitung.** Hans Bühler, Albrecht Häfele, and Arnold Peiter. *Zeitschrift für Metallkunde*, v. 47, no. 10, Oct. 1956, p. 664-671.

Measured and computed stresses show complete qualitative correspondence in the elastoplastic range and also agree well enough quantitatively.

2850* (German.) Effect of Plastic Deformation on the Magnetic Properties of Nickel Single Crystals. **Der Einfluss plastischer Verformung auf die magnetischen Eigenschaften von Nickel-Einkristallen. I.** Plastic Stress-Strain Curve and the Fatigue Law in Magnetic Saturation. **Verfestigungskurve und Gesetz der Einmündung in die magnetische Sättigung.** Hermann Dietrich and Eckart Kneller. *Zeitschrift für Metallkunde*, v. 47, no. 10, Oct. 1956, p. 672-684.

The law of approach to magnetic saturation was investigated at room temperature as a function of plastic deformation of Ni-single-crystals of different orientation.

2851* (German.) Properties of Metal Smelts. **Über die Eigenschaften metallischer Schmelzen. XII.** Internal Friction of Liquid Gold-Tin Alloy. **Die innere Reibung flüssiger Gold-Zinn-Legierungen.** Erich Gebhardt, Manfred Becker, and Konrad Kostlin. *Zeitschrift für Metallkunde*, v. 47, no. 10, Oct. 1956, p. 684-687.

Viscosity of Au-Sn melts up to 70% Au and 900 C was investigated.

See also: **2225** (hardness of Sn-Ni electrodeposits); **2282** (secondary electron emission of metal); **2294** (Hall effect in Ag-Pd alloys); **2304** (electrical properties of PbTe); **2460** (fatigue of bearings); **2461** (fatigue of ball bearings); **2481** (effects of stress concentrations on fatigue); **2482** (prediction of fatigue properties); **2483** (fatigue properties of alloy steel); **2485** (fatigue testing methods); **2486** (fatigue of steel shafts); **2487** (fatigue strength prediction); **2489** (fatigue of alloy steel); **2494** (torsion of hollow bar); **2505** (impact properties of Cu wire); **2606** (strength of welded joints); **2667** (properties of Al castings); **2698** (creep of heat resisting steels); **2889** (plastic deformation of Ge); **2905** (electrical properties of Sn in Ge crystals); **2923** (fatigue of steels); **2924** (fatigue of brass); **2927** (properties of Cr-Ni steel); **2928** (internal friction); **2929** (structural changes in machining steel); **2930** (properties of irradiated uranium alloys); **2932** (measurement of thermodynamic properties); **2934** (strength of Zr alloys); **2946** (strength of cold-worked steel); **2949** (electric resistance of Pt); **2961** (coercive force theory); **3092** (mechanical properties of metals); **3259** (cracking of welds).

METALS—MECHANICAL WORKING

2852 Electrical Discharge Saw Cuts 'Hot' Metal. Frank Bevilacqua. *American Machinist*, v. 100, Nov. 19, 1956, p. 125-129.

Rotating-disk saw cuts a variety of metals by remote control. Special unit makes decontamination easy.

2853 How Good Are Ceramic Tools? *American Machinist*, v. 100, Dec. 3, 1956, p. 113-136.

Seven different users report data obtained from experience in both test labs and production shops.

2854 The Friction Process in Metal Cutting. Iain Finnie and M. C. Shaw. *ASME, Transactions*, v. 78, Nov. 1956, p. 1649-1657.

2855 Plate Bending by Rolling. Uses of Various Types of Machines. E. L. Tinley. *Engineering*, v. 182, Nov. 9, 1956, p. 592-595; Nov. 16, 1956, p. 623-625.

Comparison of vertical and horizontal bending; support-rollers for horizontal plate bending machines; crowning of rolls to counteract deflection. Roll materials and roll-surface finish; miscellaneous techniques; dual-purpose machines.

2856 Formability of Metals. III. Press Operations. Lester F. Spencer. *Finish*, v. 13, Dec. 1956, p. 33-35, 37.

Die clearance factor; importance of sharpness; blanking of shapes; punching and piercing; influence of bend radius; press brake forming; flanging and beading operations.

2857* Effects of Screw and Speed-Setting Changes on Gauge Speed and Tension in Tandem Mills. W. C. F. Hessenberg and W. N. Jenkins. *Institution of Mechanical Engineers, Proceedings*, v. 169, no. 52, 1955, p. 1051-1062.

Relates changes in interstand tension and finishing gage. Predicts behavior of tandem mills under various conditions.

2858 Shot-Peening as Protection of Surface-Damage Propeller-Blade Materials. J. M. Lessells and R. F. Brodrick. Paper from "International Conference on Fatigue of Metals". v. III. Institution of Mechanical Engineers. 13 p. + 2 plates. (TA460 In8p Over.)

Shot-peening, if properly controlled, considerably improves the fatigue strength of subsequently damaged surfaces. Maximum improvement occurs under conditions where the depth of the compressive zone is about five times that of the gouge depth.

2859 Control Flatness of High Strength PH Sheet. L. E. Laux. *Iron Age*, v. 178, Nov. 29, 1956, p. 84-86.

Tensile strength required of the heat-treated 17-7 PH stainless steel sheet ranges from 180,000 to 210,000 psi. After this preliminary flattening, the sheets undergo vapor degreasing, then cleaning by the electro-alkaline process.

2860 How Troubleshooting Makes Bending Easier. Federico Strasser. *Iron Age*, v. 178, Dec. 6, 1956, p. 132-134.

Points to consider in locating potential trouble spots. Bending operations.

2861 A Mill for Cold Rolling Metals to Close Tolerances. Michael G. Sendzimir and Ludwik Zdanowicz. *Iron and Steel Engineer*, v. 33, Nov. 1956, p. 65-70.

Mill is used for both ferrous and non-ferrous metals where surface finish standards and tolerances are unusually rigid. Large reductions may be obtained in a single pass.

2862 Integrated Electro-Mechanical Press Puller Drive System Improves Extrusion Quality. R. C. Suttle. *Iron and Steel Engineer*, v. 33, Nov. 1956, p. 83-88.

Unit features reduced manpower requirements, installation ease, maintenance facility, accurate puller tension, and high speed electrical response.

2863 Rolling Mills for Processing Nuclear Fuel Elements. A. I. Nussbaum. *Iron and Steel Engineer*, v. 33, Nov. 1956, p. 93-103.

Fundamental design and operation; basic materials and their workability; glovebox enclosures; sequence of fabrication; reprocessing spent fuel.

2864 Selection of a Lubricant for Cold Drawing. I. Coarse Steel Wire. Bruce W. Siemon. **II. Fine Steel Wire.** W. B. Bauzenberger. *Iron and Steel Engineer*, v. 33, Nov. 1956, p. 105-108.

Applications of various types of lubricants. Speed and severity of drawing, material, and desired product finish are factors influencing selection.

2865 An X-Ray Examination of Preferred Orientation and the Transformation γ-α in a Stainless-Steel Wire. K. W. Andrews. *Iron and Steel Institute, Journal*, v. 184, Nov. 1956, p. 274-286.

The austenite undergoes transformation to ferrite on cold drawing. The maximum amount of ferrite depends on the composition, but also increases towards the center of the wire.

2866 Increased Heating Rates for Steel Ingots. P. M. Cook and J. D. Stringer. *Iron and Steel Institute, Journal*, v. 184, Nov. 1956, p. 309-315.

Potential advantages of rapid heating are increased production from existing furnace capacity, reduction of scale losses and decarburization, and fuel economy.

2867 Stretch Forming Under Fluid Pressure. P. B. Mellor. *Journal of the Mechanics and Physics of Solids*, v. 5, Nov. 1956, p. 41-56.

An investigation into the hydrostatic bulging of circular metal diaphragms. Derivation of strain-hardening characteristics for several materials.

2868 Great Falls Billet Plant. Roy H. Miller and L. J. Ingvalson. *Journal of Metals*, v. 8; *American Institute of Mining and Metallurgical Engineers, Transactions*, v. 206, Dec. 1956, p. 1661-1664.

Construction and operation of plant which produces 3-in. diameter billets with a high P content from cathode Cu.

2869 Industrial Honing. I. D. Warburton-Brown. *Machinery Lloyd (Overseas Ed.)*, v. 28, Nov. 10, 1956, p. 70-71, 73-75.

Factors affecting honing performance; abrasives and their classification; cutting action of abrasive grits.

2870 Dimpling Stainless Steel Foil. J. E. Hagins. *Machinery (London)*, v. 89, Nov. 16, 1956, p. 1126-1127.

To avoid problems associated with wrinkling and cracking, the sheets are embossed with a pattern of dimples using an Al embossing die.

2871 (Dutch.) Problems in Deep-Drawing Research. **Problemen bij het dieptrekonderzoek.** J. H. Zaat. *Metaalinstituut T. N. O.*, 1956, no. 41, June 1956, 8 p. (TN603 M56p Contin.)

Discusses why, where, and how deep-drawing research should be carried out.

2872 Extrusion of Metals. P. Feltham. *Metal Treatment and Drop Forging*, v. 23, Nov. 1956, p. 440-444.

Relations between extrusion force, ram velocity, friction at the billet container interface, and high-temperature rheological properties of metals are established and used to evaluate extrusion pressures for Al, Cu, and Pb.

2873* High Rake Cutters for High Tensile Steels. Peter Trippe. *Metalworking Production*, v. 100, Oct. 26, 1956, p. 1723-1729.

Cutters can extend the range of high rake milling into the high tensile range, with considerable advantages in speed and cutter life.

2874* Proper Truing and Dressing Means Better Toolroom Grinding. John A. Mueller. *Metalworking Production*, v. 100, Nov. 2, 1956, p. 1775-1780.

Ways to avoid grinding troubles, such as chatter, burning, cracking, and rough surfaces, are recommended on the basis of a series of controlled tests.

2875* On the Wear of Cutting Tools. M. C. Shaw and S. O. Dirke. *Microtecnic (English Ed.)*, v. 10, no. 4, 1956, p. 187-193.

Nature of wear and metal transfer is developed and applied to explain the wear performance of cutting tools. Underlying reasons behind trends observed in tool life testing.

2876* (German.) Production of Acid-Resisting Plated Sheet Steel. **Herstellung säurebeständiger plattierter Stahlbleche.** Richard O'Donnel. *Neue Hütte*, v. 1, no. 8, Sept. 1956, p. 469-475.

Covers preparation and piling, preheating, roughing, intermediate roll-down, and sheeting.

2877* (German.) The Load on a Three-High Finishing Stand and on Its Drive in Rolling Sheet, Bars, and Billets. **Belastung eines Trio-Fertiggerüstes und seines Antriebes beim Warmwalzen von Platinen und Knüppeln.** Werner Lueg and Hans-Günter Müller. *Stahl und Eisen*, v. 76, no. 22, Nov. 1, 1956, p. 1457-1463.

Peaks of roll force and torque and their causes; distribution of the torque on the coupling spindles.

2878* (German.) The Problem of Load Distribution on Continuous Billet Rolling Mill Trains. **Zur Lastverteilung bei kontinuierlich arbeitenden Knüppelstrassesn.** Werner Lueg and Hans-Günter Müller. *Stahl und Eisen*, v. 76, no. 23, Nov. 15, 1956, p. 1562-1564.

Effects of the longitudinal pull and pressure in the rolled product on the load absorption of the stands.

2879* (Russian.) Effect of Technological Factors of Rolling on the Quality of Bessemer Rails. **Vliianie tekhnologicheskikh faktorov prokatki na kachestvo bessemerovskikh rel'sov.** N. I. Beda, N. K. Borisenko, G. P. Kotov, and E. M. Mal'tseva. *Stal'*, v. 16, no. 10, Oct. 1956, p. 897-900.

Effect of the temperature of rolling, deformation of metal during blooming, and condition of roll surface. Optimal soaking temperature of ingots was determined.

2880* (Russian.) Effect of Sections and Temperature of Rolls on Weldability in Sheet Pack Rolling. **Vliianie profilia i temperatury valkov na svarivaemost' listov pri paketnoi**

prokatke. D. I. Suiarov and P. F. Zasukha. *Stal'*, v. 16, no. 10, Oct. 1956, p. 901-904.

2881* (Russian.) Manufacture of Seamless Thin-Wall Pipes of Large and Medium Diameters. **Proizvodstvo besshovnykh tonkostennykh trub bol'shikh i srednikh diametrov.** S. I. Borisov. *Stal'*, v. 16, no. 10, Oct. 1956, p. 905-908.

Suggestions for improvements in manufacturing large pipes for the petroleum industry.

2882* (Russian.) Rolling Square Steel Sections With Sharp Corners. **Prokatka kvadratnoi stali s ostrymi kromkami.** M. V. Shuralev and S. G. Nekrasov. *Stal'*, v. 16, no. 11, Nov. 1956, p. 997-999.

A method was developed for accurate rolling of sections with sharp corners and flat faces. Discussion of changes made in equipment and rolling procedures.

2883* (Russian.) Cutting Steel With Oxygen in Continuous Casting Plants. **Kislorodnaia rezka stali v ustanovkakh nepreryvnoi razlivki.** O. Sh. Spektor. *Stal'*, v. 16, no. 11, Nov. 1956, p. 1042-1048.

Details of apparatus and techniques for horizontal cutting of C steel heated to temperatures from 800 to 1200 C.

2884* (Russian.) Effect of Cold Hardening on Drawing of Heat-Resistant Materials. **Vliianie naklepa pri protiagivanü zharoprochnykh materialov.** N. F. Pronkin. *Stanki i Instrument*, v. 27, no. 10, Oct. 1956, p. 29-31.

Effect of cold hardening on machinability and strength. Experimental data. Method and devices of investigation.

2885 Split Die Forging Solves a Problem. Drury D. Turner. *Steel*, v. 139, Nov. 26, 1956, p. 94-96.

Huge multiram press combines horizontal-acting split dies with a vertical ram to form a complex steel valve body.

2886 We're Ready for Volume Business, Say Extruders of Titanium. *Steel*, v. 139, Dec. 10, 1956, p. 142-145.

U. S. Extruders and what they are doing. Current extrusion practice with particular reference to temperature, and lubricants.

2887* (German.) Metal Cutting of Copper and Copper Alloys With Hard Metal Tools. **Zur spanabhebenden Bearbeitung von Kupfer und Kupferlegierungen mit Hartmetallwerkzeugen.** J. Witthoff. *Technische Mitteilungen Krupp*, v. 14, no. 5, Nov. 1956, p. 123-131.

Grinding, lapping, and polishing of different types of Cu and Cu alloys; various phases of machining.

2888* Wire Flattening Practice. R. D. Weber. *Wire Industry*, v. 23, Nov. 1956, p. 1007, 1009-1012, 1030.

Wire flattening as a means of increased production; plant layout; production of transformer strip; cost data.

See also: **2182** (machine tool control systems); **2715** (shot peening of steel); **2746** (flow in hot rolling process); **2748** (effects of shot peening on fatigue); **2891** (structure of metal-cutting chips); **2894** (heating of steel ingots); **2986** (die wear measurement).

METALS—METALLOGRAPHY, TRANSFORMATIONS, AND STRUCTURES

2889 Dislocations and Plastic Flow in Germanium. Earl S. Greiner and William C. Ellis. *Bell Laboratories Record*, v. 34, Nov. 1956, p. 403-406.

Conductivity studies demonstrate the introduction of other imperfections in plastic flow, and provide means for identifying the types of these imperfections and estimates of their concentrations.

2890 Fracture Grain Size, Austenite Grain Size, and Martensite Structure. B. D. Enlund. *Henry Brutcher Translation No.* 3207, 3 p. (From *Jernkontorets Annaler*, v. 134, no. 11, 1950, p. 553-555.) Henry Brutcher, Altadena, Calif.

Fracture seems to depend on austenitic grain size and not on quenched structure, at least for coarse grains.

2891 X-Ray Study of Structure of Chips Obtained in Metal Cutting. S. I. Gubkin and L. T. Mendeleev. *Henry Brutcher Translation No.* 3311, 5 p. (From *Doklady Akademii Nauk SSSR*, v. 95, no. 1, 1954, p. 73-74.) Henry Brutcher, Altadena, Calif.

Previously abstracted from original. See item 11563, v. 3, Aug. 1956.

2892 Growth of Gray Cast Iron. F. N. Tavadze and I. A. Bairamashvili. *Henry Brutcher Translation No.* 3815, 13 p. (From *Liteinoe Proizvodstvo*, 1956, no. 5, May 1956, p. 15-18.) Henry Brutcher, Altadena, Calif.

Previously abstracted from original. See item 11517, v. 3, Sept. 1956.

2893* (English.) **The Diffusion of Electro-Deposited Chromium Into Pure Iron.** Shigetomo Ueda. *Castings Research Laboratory, Report, Waseda University*, 1956, no. 7, p. 83-86.

Chromium plated Fe was heated in a vacuum, and the diffusion coefficient and activation energy calculated.

2894* (French.) Influence of Furnace Atmosphere on Calamine Formation in Billets. **Étude de l'influence de l'atmosphère des fours sur le calaminage des billettes.** J. Moreau. *Centre de Documentation Sidérurgique, Circulaire d'Informations Techniques*, v. 13, no. 10, 1956, p. 1973-1982.

Studies of rough rolled and scraped billets of various steels passed through furnaces differing in the heating method used.

2895 Alloy Equilibrium Diagrams. R. N. Parkins. Paper from "Chemical Engineering Practice". v. II. Academic Press, p. 113-142. (TP155 C42e)

The basic types of structure observed in alloy systems are considered in relation to the properties of metallic materials.

2896* Cobalt and Its Alloys. 108 p. 1956. Battelle Memorial Institute, Columbus. (ZQD181.C6 B32.2c)

A summary of allotropy and phase diagrams.

2897* (French.) Thermoelastic Analysis of the Transformations of Titanium. **Analyse thermoélastique des transformations du titane.** Albert Portevin and Robert Cabarat. *Comptes Rendus*, v. 243, no. 16, Oct. 15, 1956, p. 1085-1086.

Transformations in the solid state of 99.9% Ti of density 4.49 at 20 C.

2898* (French.) Determination of a Kirkendall Effect in γ-Phase Uranium-Zirconium Diffusion. **Sur la mise en évidence d'un effet kirkendall dans la diffusion uranium-zirconium en phase-γ.** Yves Adda, Jean Philibert, and Claude Mairy. *Comptes Rendus*, v. 243, no. 16, Oct. 15, 1956, p. 1115-1118.

Displacement of reference marks on initial interface as function of temperature and duration of diffusion. Coefficients of intrinsic diffusion were determined by the Darken relationship.

2899* (French.) Abnormal Scattering of X-Rays During the Precipitation in a Nickel Alloy With 7% of Silicon. **Diffusion anormale des raoyns X au cours de la précipitation dans un alliage à base de nickel contentant 7% de silicium.** Jack Manenc. *Comptes Rendus*, v. 243, no. 16, Oct. 15, 1956, p. 1119-1121.

Abnormal scattering appears in the first stage of precipitation as happens with other Ni alloys, especially Ni-Cr 80/20 hardened with Al and Ti.

2900* (French.) The Autoradiography by α Trajectories Applied to the Analysis of Uranium-Zirconium Alloys and to the Study of Uranium-Zirconium Diffusion. **Application de l'autoradiographie par trajectoires α à l'analyse d'alliages uranium-zirconium et a l'étude de la diffusion uranium-zirconium.** Henriette Faraggi, Arlette Grain-Bonnet, Yves Adda, and Jean-Marie Henry. *Comptes Rendus*, v. 243, no. 18, Oct. 29, 1956, p. 1316-1319.

A study in thick layers of U-Zr alloys showed a practical relationship between α emission and U content, which was applied to the study of diffusion.

2901* (French.) Electron Display Study of a Cellular Structure During the Cold Working Stage and Restoration of Commercial Titanium. **Mise en évidence en micrographie électronique d'une structure cellulaire, au cours de l'ecrouissage et de la restauration du titane commercial.** M. Adrien Saulnier. *Comptes Rendus*, v. 243, no. 18, Oct. 29, 1956, p. 1319-1322.

Sheets of commercially pure Ti were obtained after annealing at 650 C and cold working. The state between cold working and recrystallization was analyzed after further annealing.

2902* (French.) A New Method to Prepare Thin Metallic Films for Electron Miscroscope Examination. **Nouvelle méthode de préparation de films métalliques minces en microscopie électronique.** Noboru Takahashi and Kenji Kazato. *Comptes Rendus*, v. 243, no. 19, Nov. 5, 1956, p. 1408-1411.

A new method of obtaining the diffraction diagram and the microscopic picture of a selected portion of a specimen. Examples with various alloys.

2903* (Russian.) X-Ray Emission Spectra of Mn and Cu in Heusler Alloys Within the Range of Magnetic Transformation Temperatures. **Rentgenovskie spektry ispuskaniia Mn i Cu v splave Geislera v intervale temperatur magnitnogo prevrashcheniia.** E. E. Vainshtein and B. I. Kotliar. *Doklady Akademii Nauk SSSR*, v. 110, no. 1, Sept.-Oct. 1956, p. 44-47.

A study of the shape and position of lines of the Kβ-band of the Mn and Cu spectra in the Cu_2MnAl-type alloy in the ferromagnetic and the paramagnetic states as well as the K$\alpha_{1,2}$-lines of the same elements over a wide temperature range.

2904* (Russian.) Low-Temperature Recrystallization in Metals. **Nizkotemperaturnaia rekristallizatsiia metallov.** R. I. Garber, I. A. Gindin, V. S. Kogan, and B. G. Lazarev. *Doklady Akademii Nauk SSSR*, v. 110, no. 1, Sept.-Oct. 1956, p. 64-66 + 1 plate.

A study of the changes occurring in the micro-structure of commercial Fe (0.03% C) and Ni deformed at the temperature of liquid N.

2905 Solid Solubilities and Electrical Properties of Tin in Germanium Single Crystals. F. A. Trumbore. *Electrochemical Society, Journal*, v. 103, Nov. 1956, p. 597-600.

Solubility was determined from 400 C to the melting point of Ge using conventional crystal pulling techniques and crystal growth from melts in a thermal gradient. Results confirm the electrical neutrality of Sn in Ge.

2906 Metallography as an Aid to Electrodeposition. A. Comley. *Electroplating and Metal Finishing*, v. 9, Nov. 1956, p. 355-361.

Metallographic techniques; their application to problems such as roughness, nodules, pits, and other defects.

2907* (Russian.) Diffusion of Cobalt in Cobalt-Aluminum Alloys. **Diffuziia kobal'ta v kobal't-aliuminovykh splavakh.** S. O. Gertsriken and I. Ia. Dekhtiar. *Fizika Metallov i Metallovedenie*, v. 3, no. 2, 1956, p. 242-246.

Determining the parameters of diffusion of Co in Co-Al alloys.

2908* (Russian.) Diffusion Studies on the Elimination, by Heating at Elevated Temperatures, of the Traces of Martensitic Transformations. **Diffuzionnoe issledovanie ustraneniia pri vysoko-temperaturnom nagreve sledov martensitnogo prevrashcheniia.** *Fizika Metallov i Metallovedenie*, v. 3, no. 2, 1956, p. 278-281.

The variation in self-diffusion as a function of the temperature and time of pre-diffusion heat treatment.

2909* (Russian.) Peculiarities in the Structure of Structural Steel in the Reversible Temper Brittleness State. **Strukturnye obsobennosti konstruktsionnoi stali v sostoianii obratimoi otpusknoi khrupkosti. I.** Microstructure Studies. **Mikrostrukturnoe issledovanie. II.** Fractographic Studies. **Fraktograficheskoe issledovanie.** S. F. Iur'ev and Z. I. Kusnitsina. *Fizika Metallov i Metallovedenie*, v. 3, no. 2, 1956, p. 280-298 + 2 plates.

A study to determine the structural elements along which the fracture develops in steels due to temper brittleness.

2910* (Russian.) Non-Homogeneity of Carbon in Martensite After High Frequency Tempering of Steel Specimens. **Neodnorodnost' martensita po uglerodu posle vysokochastotnoi zakalki stal'nykh obraztsov.** I. N. Kidin. *Fizika Metallov i Metallovdenie*, v. 3, no. 2, 1956, p. 299-305.

X-rays make possible a more accurate analysis of the C non-homogeneity which is useful in explaining structural changes and properties of steel after H.F. tempering.

2911* (Russian.) Relationship Between the Carbon Content in Martensite and the Heating Parameters of High Frequency Tempered Steel Specimens. **Zavisimost' soderzhaniia ugleroda v martensite ot parametrov nagreva stal'nykh obraztsov pri vysokochastotnoi zakalke.** I. N. Kidin. *Fizika Metallov i Metallovedenie*, v. 3, no. 2, 1956, p. 306-308.

Concludes that the high degree of hardness after H.F. tempering is determined by both the total amount of C in the steel and its distribution in the martensite crystals.

2912* (Russian.) Recrystallization Texture of Cold-Drawn Steel. **Tekstura rekristallizatsii kholodnotianutoi stali.** Ts. N. Rafalovich. *Fizika Metallov i Metallovedenie*, v. 3, no. 2, 1956, p. 326-331.

Tests on two types of steel indicated that the orientation of the crystallites of the texture of recrystallization were completely identical with the orientation of the texture of the deformed matrix.

2913* (Russian.) The Effects of Deformation Conditions on the Tendency of Steel to Mechanical Aging. **Vliianie uslovii deformirovaniia na sklonnost' stali k mekhanicheskomu stareniu.** M. I. Kurmanov. *Fizika Metallov i Metallovedenie*, v. 3, no. 2, 1956, p. 332-340.

The effects of aging can be reduced by reducing the N and O content or by combining them into stable solution by admixtures of B, V, or Al.

2914* (Russian.) The Effects of the Rate of Growth of Aluminum Single Crystals on Their Mosaic Structure. **Vliianie skorosti rosta monokristallov aliuminiia na ikh mozaichnuiu strukturu.** D. E. Ovsienko and E. I. Sosina. *Fiziki Metallov i Metallovedenie*, v. 3, no. 2, 1956, p. 374-382.

Recrystallization conditions and the fine structure of Al single crystals. Increasing the rate of growth increases the disorientation of the mosaic blocks.

2915* (Italian.) Thermodynamic Investigations on Metallic Systems. **Richerche termodinamiche su sistemi metallici. IX.** The Liquid System Zn-Bi-Pb. **Sistema liquido Zn-Bi-Pb.** Venanzio Valenti, Luigi Oleari, and Mario Fiorani. *Gazzetta Chimica Italiana*, v. 86, no. 11, Nov. 1956, p. 930-941.

The electromotive method was used to determine the sections of immiscibility at the isotherms of 440 and 520 C for the Zn-Bi-Pb system. The three pseudo-binaries studied coincided with the corresponding lines on the diagram.

2916* (Czech.) Structural Stability of Alloys With High Amounts of Chromium and Carbon. **Strukturní stabilita slitin s vysokým obsahem chromu a uhlíku.** Karel Löbl, Hanuš Tůma, and Jaroslav Ježek. *Hutnické Listy*, v. 11, no. 10, Oct. 1956, p. 592-599.

Influence of temperature and annealing time in an alloy with 30% Cr and 3% C. Structure, chemical composition, and morphology of carbides.

2917* (Czech.) New Views on Grinding and Polishing, Especially Metallographic Polishing. **Nová hlediska na broušeni a leštění zejména metalografických výbrusů.** Zdeněk Ministr. *Hutník*, v. 6, no. 9, Sept. 1956, p. 257-262.

Theoretical considerations. Excellent results obtained by using diamonds dispersed in a paste.

2918 Observations on Grain-Boundary Migration in Aluminium Bicrystals. K. T. Aust, E. H. Harrison, and R. Maddin. *Institute of Metals, Journal*, v. 85, Sept. 1956, p. 15-16.

Rates of migration were measured at temperatures of 560, 600, and 640 C for strain-free bicrystals having orientation differences of 55 and 85° about [110].

2919 The Constitution of Tin-Indium Alloys in the Range 0-30 Per Cent Indium. J. C. Blade and E. C. Ellwood. *Institute of Metals, Journal*, v. 85, Sept. 1956, p. 30-32.

Equilibrium relationships at the tin-rich end of the Sn-In diagram. Eight per cent of In is soluble in Sn at 205 C and about 6% at 50 C.

2920 The Nature of Mechanically Polished Metal Surfaces: The Surface Deformation Produced by the Abrasion and Polishing of 70 : 30 Brass. L. E. Samuels. *Institute of Metals, Journal*, v. 85, Oct. 1956, p. 51-62 + 4 plates.

Certain principles are established for methods by which surfaces free from serious strains may be produced by mechanical meth-

ods of polishing. Structure suggests that fine metallographic polishing operations occur essentially by a cutting mechanism.

2921 The System Uranium-Palladium. J. A. Catterall, J. D. Grogan, and R. J. Pleasance. *Institute of Metals, Journal*, v. 85, Oct. 1956, p. 63-67 + 2 plates.

Preparation of alloys; metallography; thermal X-ray and chemical analysis; liquids; solid solutions; the compounds UPd,UPd_2, and U_5Pd_6.

2922 The Behaviour of Interfaces in Lightly Worked Uranium During Recrystallization. P. E. Madsen. *Institute of Metals, Journal*, v. 85, Oct. 1956, p. 71-75 + 3 plates.

The boundaries of twins and kinks in U appear to possess an appreciable surface energy, and on annealing they undergo alterations which would be expected from a tendency to reduce the surface area.

2923 Metallographic Observations on the Fatigue of Steels. H. Hempel. Paper from "International Conference on Fatigue of Metals". v. II. Institution of Mechanical Engineers. 7 p. + 15 plates. (TA460 In8p Over.)

Formation of slip markings and propagation of cracks at room-temperature; formation of twin crystals at low temperature.

2924 Observations on the Microstructure of a Brass Containing 67 Per Cent of Copper, Subjected to Alternating Bending Stresses. P. A. Jacquet. Paper from "International Conference on Fatigue of Metals". v. II. Institution of Mechanical Engineers. 6 p. + 7 plates. (TA460 In8p Over.)

Microscope reveals the crystallographic lattice of grains of α-brass which appear on the surface, and also in the deeper layers, under the effect of alternating stresses. The cracks are the direct consequences of these disorders, and develop further on subsequent annealing.

2925 Electron Metallography of Ferrous Materials. J. Nutting. *Iron & Steel*, v. 29, Nov. 1956, p. 497-501.

A review of recent experimental work. (To be concluded.)

2926 Alloy Carbides Precipitated During the Fourth Stage of Tempering. An Electron Microscopic Examination. Kehsin Kuo. *Iron and Steel Institute, Journal*, v. 184, Nov. 1956, p. 258-268.

The precipitation of minute Mo_2C, VC, and TiC threads at 500 to 600 C causes an increase in hardness, and their growth into needles, discs, and spheroids above 600 C causes a decrease.

2927 The Occurrence of Sigma-Phase in a High-Chromium-Nickel Steel With Particular Reference to the Influence of Silicon. L. Pryce, H. Hughes, and K. W. Andrews. *Iron and Steel Institute, Journal*, v. 184, Nov. 1956, p. 289-301.

New work establishes the pronounced effect of Si on the formation of σ by increasing both the amount of the phase and its speed of formation.

2928 The Determination of the Alpha Phase Boundaries of the Iron-Nitrogen System by Internal Friction Methods. R. Rawlings and D. Tambini. *Iron and Steel Institute, Journal*, v. 184, Nov. 1956, p. 302-308.

Solubility of Fe_4N in Fe was determined using the internal friction method. Equilibrium was approached by nitriding for comparison with the results obtained by precipitation by Dijkstra.

2929* (Russian.) X-Ray Examination of the Structural Changes Produced by Machining a Steel Surface. **Rentgenograficheskoe issledovanie strukturnykh izmenenii v poverkhnostnom sloe stali, obrabotannoi tocheniem.** O. N. Shivrin. *Izvestiia Akademii Nauk SSSR, Seriia Fizicheskaia*, v. 20, no. 7, July 1956, p. 736-739.

Study of the unevenness produced on the surface layers of the metal by heavy machining, of a method to raise the primary, secondary, and tertiary stresses with varying parameters of the cutting capacity, and a process to relieve these stresses by tempering.

2930 Phase Changes in Pile-Irradiated Uranium-Base Alloys. M. L. Bleiberg, L. J. Jones, and B. Lustman. *Journal of Applied Physics*, v. 27, Nov. 1956, p. 1270-1283.

Electrical resistivity, temperature coefficient of electrical resistivity, hardness, and density measurements as well as X-ray diffraction patterns indicated that the stable phases at room temperature reverted to the metastable γ-phase during irradiation.

2931 Effects of Growth Rate on Crystal Perfection and Lifetime in Germanium. A. D. Kurtz, S. A. Kulin, and B. L. Averbach. *Journal of Applied Physics*, v. 27, Nov. 1956, p. 1287- 1290.

Effects of crystal growth rate and growth direction on the density of random dislocations and on the minority carrier lifetime.

2932 Mass Spectrometric Study of Phase Changes in Aluminum, Praseodymium, and Neodymium. Robert G. Johnson, Donald E. Hudson, Wallace C. Caldwell, Frank H. Spedding, and William R. Savage. *Journal of Chemical Physics*, v. 25, Nov. 1956, p. 917-925.

A sensitive method for measuring rapidly the latent heat of vaporization or sublimation of metals of low volatility. Latent heat, melting point, and phase transition temperature measurements.

2933 The Deformation of Molybdenum Single Crystals in Compression. J. H. Hoke and R. Maddin. *Journal of the Mechanics and Physics of Solids*, v. 5, Nov. 1956, p. 26-40 + 4 plates.

Results from compression of 43 body-centered cubic crystals indicate that the slip takes place in a[111]direction, along zones of weakness which are influenced by external variables such as extraneous grains, prior deformation, and anvil or grip effect. Axis migration is toward the pole of the gross slip plane responsible for the slip markings. Distortion of the Laue reflections is increased by the presence of additional slip systems and is not homogeneous. The crystals are very strain-rate sensitive and exhibit a marked tendency for recovery after deformation. Strain hardening rates are dependent on orientation.

2934 Beta-Omega Age Hardening Means Stronger Zirconium Alloys. H. A. Robinson, J. R. Doig, M. W. Mote, C. M. Schwartz, and P. D. Frost. *Journal of Metals*, v. 8, Nov. 1956, p. 1544-1545.

The β-ω phase transformation, important in many Ti alloys, was revealed in Zr alloys. Hitherto unattainable tensile strength with adequate ductility is now feasible for certain Zr alloys.

2935 Self-Diffusion of Iron in Molten Fe-C Alloys. Ling Yang, M. T. Simnad, and G. Derge. *Journal of Metals*, v. 8; *American Institute of Mining and Metallurgical Engineers, Transactions*, v. 206, Nov. 1956, p. 1577-1580.

Diffusion coefficients measured by using the capillary method. Samples were autoradiographed and sectioned to insure that no significant convection occured during the diffusion.

2936 The Palladium-Tritium System at Low Temperature. R. M. Haag and F. J. Shipko. *Knolls Atomic Power Laboratory (U. S. Atomic Energy Commission)*, KAPL-1097, June 1956, 40 p. (UF767 Un3.1ka Contin.)

Equilibrium was readily obtained at zero C. Below this, production of He-3 by radioactive decomposition of tritium imposed limits upon the duration of any run, and, in conjunction with slower reaction rates, decreased precision.

2937* (Dutch.) Geometric Description of Dislocations. **Meetkundige beschrijving van dislocaties.** W. G. Burgers. *Metalen*, v. 11, no. 20, Oct. 31, 1956, p. 451-457; no. 21, Nov. 15, 1956, p. 477-482.

Dislocations of the line, screw, edge, and incomplete types are related by Burgers vector. Intersection of dislocation lines, network dislocations, and lattice defects.

2938* (German.) Coarse Grain Formation in Copper With Trace Element Inclusions. **Grobkornbildung von Kupfer mit-Spurenelementen.** F. Erdmann-Jesnitzer and E. Vogler. *Metall*, v. 10, nos. 21-22, Nov. 1956, p. 1008-1020.

Effect of Fe, Sn, Ni, Zn, Mn, Mg, P, and S on the crystallization of pure Cu at various temperatures.

2939* (German.) Copper-Lead Alloys. **Kupfer-Blei-Legierungen. I.** Melting Diagram and Structure Formation of Binary Alloys. **Das Schmelzdiagramm und der Gefügeaufbau binärer Legierungen.** *Metall*, v. 10, nos. 21-22, Nov. 1956, p. 1023-1028.

Binary constitutional diagram of Cu-Pb alloys of different ratios from 955 to 1020 C.

2940* (German.) Examination With the Electron Microscope of Electrolytically Polished Metal Surfaces. **Elektronenmikroskopische Untersuchung elektrolytisch geglänzter Metalloberflächen. I.** H. Poppa and H. Spähn. *Metalloberfläche*, v. 10, no. 11, Nov. 1956, p. 329-335.

A study of the structure of various polished metal surfaces to determine optimum polishing procedures.

2941* (Russian.) On the Intermediate Transformation of Austenite. **O promezhutochnom prevrashchenii austenita.** L. M. Pevzner, T. D. Kubyshkina, G. M. Rovenskii, and A. I. Samoilov. *Metallovedenie i Obrabotka Metallov*, 1956, no. 10, Oct. 1956, p. 2-20.

A study of the re-distribution of C in the process of the intermediate transformation of austenite, and of the kinetics of the ultimate stages of decomposition. The transformation was observable in all alloy steels in special diffusion conditions.

2942* (Russian.) On the Pearlite Transformation in Alloy Steel. **O perlitnom prevrashchenii v legirovannoi stali.** R. I. Entin. *Metallovedenie i Obrabotka Metallov*, 1956, no. 10, Oct. 1956, p. 20-28.

Criticism of a study of the influence of the alloying elements on the kinetics of pearlite transformation and of the structural and chemical cohesion of the phases of austenite decomposition.

2943* (Russian.) On Grain Growth in Commercial Titanium During Heating. **O roste zerna tekhnicheskogo titana pri nagreve.** L. N. Sokolov. *Metallovedenie i Obrabotka Metallov*, 1956, no. 10, Oct. 1956, p. 34-36.

The effect of the heating temperature and soaking time on previously deformed commercial Ti.

2944 Metal Whiskers. G. W. Sears and S. S. Brenner. *Metal Progress*, v. 70, Nov. 1956, p. 85-89.

The strength of small metal whiskers is close to the theoretical value. Strength decrease as size increases although many other of the unusual properties are retained.

2945 Isothermal and Continuous-Cooling Transformation Diagrams. G. Mayer. *Metal Treatment and Drop Forging*, v. 23, Nov. 1956, p. 451-456.

General features of isothermal transformation diagrams and their application to continuous-cooling conditions. (To be continued.)

2946* (German.) Investigation of Strain Hardened, Low-Carbon, Manganiferous Structural Steels After Annealing. **Untersuchungen zu kaltverfestigten, niedriggekohlten, manganhaltigen Baustählen nach Anlassglühungen. II.** Metallo-Physical Researches. **Metallphysikalische Untersuchungen.** Friedrich Erdmann-Jesnitzer. *Neue Hütte*, v. 1, no. 8, Sept. 1956, p. 477-486.

Comparison of the phenomena in aging of steel with age hardening of duralumin. Variation of mechanical strength values including notched-bar impact strength of cold worked steels by means of annealing.

2947 Soft X-Ray Spectroscopy of Solid Solutions of Aluminium and Magnesium. B. Gale and J. Trotter. *Philosophical Magazine*, v. 1, ser. 8, no. 8, Aug. 1956, p. 759-770.

Widths and shapes of the solute bands differ considerably both from those of the solvents and the corresponding pure metals.

An attempt was made to correlate some of the changes.

2948 Etchpits and Dislocations in Zinz Single Crystals. A. H. A. Méléka. *Philosophical Magazine*, v. 1, ser. 8, no. 9, Sept. 1956, p. 803-811.

High-purity Zn single crystals were etched in 0.1% I in alcohol and the distribution of the etchpits was studied.

2949 Quenching Vacancies in Platinum. F. J. Bradshaw and S. Pearson. *Philosophical Magazine*, v. 1, ser. 8, no. 9, Sept. 1956, p. 812-820.

It was found that the electric resistance after quenching was greater than its original value but that the increase could be removed by annealing at temperatures in the region of 400 C.

2950 The Stress to Move a Free Dislocation in Alpha Iron. J. Heslop and N. J. Petch. *Philosophical Magazine*, v. 1, ser. 8, no. 9, Sept. 1956, p. 866-873.

The portion of this stress due to interaction with random C and N atoms is idependent of temperature. At low temperatures, a very temperature-dependent portion is dominant.

2951 Mechanism of Diffusion of Copper in Germanium. F. C. Frank and D. Turnbull. *Physical Review*, v. 104, ser. 2, Nov. 1, 1956, p. 617-618.

In the interstitial state solubility of Cu is about 10^{-2} times less and diffusivity many orders of magnitude greater than in the substitutional state. Conversion from interstitial to substitutional is effected by lattice vacancies which are generated at free surfaces and dislocations.

2952 (French.) Cold Disorganization and Reconstruction of Aluminum Crystals Subjected to Low Tensile Stresses. **Sur la désorganisation et la restauration a froid de cristaux d'aluminium soumis a des tractions faibles.** J. Caisso. *Publications Scientifiques et Techniques du Ministère de l'Air*, 1956, no. 316, 46 p. (TL502 F84.1p Vis.)

A low stress generally produces a dislocation and a more or less perfect reconstruction in crystals. One or the other can become predominant. According to the initial dislocation, one or two transition points are found at the beginning of the tension curve for elongation values depending upon the crystal orientation, its initial dislocation, and direction of the stress.

2953* (German.) Introduction in the Science of Dislocations by Means of Symbols and Models. **Einführung in die Lehre von den Versetzungen mit Hilfe von Symbolen und Modellen.** E. Knuth-Winterfeldt. *Radex Rundschau*, 1956, no. 7, Oct. 1956, p. 315-326.

Introduces dislocation of edge screws and combined dislocations by means of combination models and elastic models.

2954* (German.) Contemporary State of Knowledge of Austenite Transformation in Steels. **Gegenwärtiger Stand der Kenntnisse über die Austenitumwandlung der Stähle.** A. Rose. *Schweizer Archiv für Angewandte Wissenschaft und Technik*, v. 22, no. 10, Oct. 1956, p. 305-318.

TTT diagrams for isothermal transformation and for continuous cooling are given for technical steel alloys.

2955* (German.) Investigation on the Type and Distribution of Non-Metallic Inclusions in Ingots Made of Effervescent Soft Open-Hearth Steel. **Untersuchung über die Art und Verteilung von nichtmetallischen Einschlüssen in Rohblöcken aus unberuhigtem, weichem Siemens-Martin-Stahl.** Hubert Hoff, Heinz Lessing, and Georg Masing. *Stahl und Eisen*, v. 76, no. 22, Nov. 1, 1956, p. 1442-1452 + 2 plates.

A study of inclusions isolated from five ton ingots by using the washing method.

2956* (German.) Grain Boundaries and Grain Boundary Matter in Commercial Ferrous Materials. **Korngrenzen und Korngrenzen-Zwischenstoffe in technischen Eisenwerkstoffen.** Hans-Kurt Görlich and Hermann Schenck. *Stahl und Eisen*, v. 76, no. 22, Nov. 1, 1956, p. 1479-1486.

The nature, properties, and importance of grain boundaries and the matter between them in unalloyed steels.

2957 The Metallographic View. XXVIII. Metallography of Nitrided Cases. Howard E. Boyer. *Steel Processing*, v. 42, Nov. 1956, p. 639-640.

Microstructure and hardness of an Al bearing nitriding steel.

2958* (German.) The Quasibinary Systems of Chromium Carbide Cr_7C_3 With the Carbides of Titanium, Tantalum and Tungsten. **Über die quasibinären Systeme des Chromkarbids Cr_7C_3 mit den Karbiden des Titans, Tantals und Wolframs.** O. Rüdiger. *Technische Mitteilungen Krupp*, v. 14, no. 5, Nov. 1956, p. 136-139.

Determination of behavior and relationship to crystal structure; no continuous succession of mixed crystals is formed.

2959* (Russian.) Methods of Studying the Isothermal Decomposition of Structurally Free Carbides in Cast Iron. **Metodika izucheniia izotermicheskogo raspada strukturno-svobodnykh karbidov v chugune.** M. V. Voloschenko. *Zavodskaia Laboratoriia*, v. 22, no. 10, Oct. 1956, p. 1194-1197.

Kinetics of carbide decomposition when cast-iron specimen is protected by Cr plating and when unprotected. Microstructural changes in specimens before and after heat treatment.

2960* (Russian.) Some Methods for Determining Recrystallization Temperatures. **Nekotorye metody opredeleniia temperatur rekristallizatsii.** G. K. L'vov. *Zavodskaia Laboratoriia*, v. 22, no. 10, Oct. 1956, p. 1198-1200.

Change in coercive force and in hardness during recrystallization. Measurement by the double-hardness method and the microstructural method with local deformation. Effect of heating and of Si content.

2961* (German.) On the Significance of the Dislocation Layer for the Coercive Force Theory of Recrystallized Materials. **Über die Bedeutung der Versetzungsdichte für die Theorie der Koerzitivkraft rekristallisierter Werkstoffe.** Martin Kersten. *Zeitschrift für Angewandte Physik*, v. 8, no. 10, Oct. 1956, p. 496-502.

An attempt to derive a quantitative theory of ferromagnetic hysteresis and of coercive force of technically pure recrystallized materials from the hypothesis that the curvature of the Block wall under the pressure of the field energy is the important elementary feature.

2962* (German.) Accurate Determination of Lattice Constants by Means of a Counter-Tube Interference Goniometer. **Über die Präzisionsbestimmung von Gitterkonstanten mit dem Zählrohr-Interferenz-Goniometer.** Hans Neff. *Zeitschrift für Angewandte Physik*, v. 8, no. 10, Oct. 1956, p. 505-507.

The counter-tube-interference-goniometer was used in connection with the Cornu method for the accurate determination of lattice constants.

2963* (German.) Hardening and Separation of Platinum-Iridium Alloys. **Aushärtung und Entmischung der Platin-Iridium-Legierungen.** Ernst Raub and Werner Plate. *Zeitschrift für Metallkunde*, v. 47, no. 10, Oct. 1956, p. 688-693.

Alloys show a broad miscibility gap at lower temperatures with its highest point at approximately 975 C and 50% Ir. At 700 C the gap extends from 7 to 99% Ir.

2964* (German.) The Orientation of Metal Layers Deposited by Vaporization on Copper Single Crystal Surfaces—Electron Interference Examination. **Zur Orientierung von Metallaufdampfschichten auf Kupfereinkristallflächen (nach Beobachtungen mit Elektroneninterferenzen).** Oswald Haase. *Zeitschrift für Naturforschung*, v. 11a, no. 10, Oct. 1956, p. 862-864 + 2 plates.

Surfaces of Cu single crystals were electrolytically polished and then cleaned by a special process. Copper, Ag, Au, Pd, and Zn were vapor-deposited. The resulting layer orientation was observed in each case and explained.

2965* (German.) Fundamentals of Diffraction Microscopy. **Grundlagen einer Beugungsmikroskopie.** R. Hosemann and R. Bonart. *Zeitschrift für Physik*, v. 146, no. 3, 1956, p. 350-371.

From the data revealed by an X-ray diagram a theory is built concerning the structure of the substance examined. The aberrations and limit of resolution existing with the diffraction have first to be quantitatively evaluated. Solution of the contradictions between the conventional liquid theory and the theory of the ideal paracrystal.

2966* (Russian.) Stability of Crystalline Structure of Solid Solution HgSe-HgTe System. **Ob ustoichivosti kristallicheskoi struktury sistemy tverdykh rastvorov HgSe-HgTe.** O. D. Elpat'evskaia, R. A. Konikova, A. R. Regel', and I. V. Iavorskii. *Zhurnal Tekhicheskoi Fiziki*, v. 26, no. 10, Oct. 1956, p. 2154-2156.

X-ray studies of different samples. Ranges of HgTe dissociation are established by means of vacuum evaporation.

2967* (Russian.) The Diffusion of Lead in Lead Telluride. **Diffuziia svintsa v telluristom svintse.** B. I. Boltaks and Iu. N. Mokhov. *Zhurnal Tekhnicheskoi Fiziki*, v. 26, no. 11, Nov. 1956, p. 2448-2450.

Adding Pb changes conduction from hole to electron conduction. The coefficient of diffusion varies from 35 at 773 K to 0.7 at 532 K. Diffusion process is similar to that of Cu in Ge.

See also: **1930** (diffusion of argon); **2612** (solidification of ingots); **2711** (structure of fractured surfaces); **2732** (hole formation in diffusion processes); **2744** (heat of transformation in Ti and Fe); **2787** (inclusions in steel); **2796** (microstructure of Ni alloys); **2805** (recrystallization of Cu alloys); **2823** (short range order in Cu_3Au); **2824** (short range order); **2865** (transformation in stainless wire).

METALS—POWDER

2968 Porous Powder Metallurgical Products for Filtration and Related Uses. E. Bishop and G. M. Collins. Paper from "Chemical Engineering Practice". v. II. Academic Press, p. 464-482 + 4 plates. (TP155 C42e)

Manufacture and applications of porous metal articles.

2969 Powder Metallurgy. Ivor Jenkins. Paper from "Chemical Engineering Practice". v. II. Academic Press, p. 483-532. (TP155 C42e)

Manufacture, properties, and testing of metal powders; principles of compacting and sintering; general engineering components; future trends.

2970 Powder Metallurgy. IV. J. F. C. Morden. *Metal Industry*, v. 89, Nov. 16, 1956, p. 409-411.

Mixing, forming, powder characteristics, and production considerations. (To be continued.)

2971 Metal Powder Parts Get New Look. *Steel*, v. 139, Dec. 3, 1956, p. 121-124.

They're becoming larger, more intricate in cross section. New presses can make production quantities of shapes that once would have required costly tooling.

See also: **2438** (sintering furnace); **2978** (quality control procedures).

NONDESTRUCTIVE TESTING AND QUALITY CONTROL

2972 How to Measure Large Dimensions. Hans W. Schmidt. *American Machinist*, v. 100, Dec. 3, 1956, p. 145-147.

Long gage bars can be combined up to 50-ft. length to avoid special single purpose gages.

2973* (Dutch.) Radioisotopes. **Radioisotopen. IVA-IVB.** Gamma Radiography for Nondestructive Materials Testing. **Gammaradiografie voor non-destructief materiaalonderzoek.** T. van der Klis. *Bedrijf en Techniek*, v. 11, no. 265; *Electronica section*, v. 9, no. 212, Nov. 3, 1956, p. 169-173, 175; v. 11, no. 266; v. 9, no. 213, Nov. 17, 1956, p. 178-179, 181, 183.

Use of Co^{60}, Cs^{137}, Ir^{192}, and Tl^{170} to determine structure and possible defects. Gamma ray testing offers better quality results than X-rays, are less expensive, and are the only way possible when access to specimens and room are limited, such as in pipe-line welds.

2974 Non-Destructive Testing of Light Alloy Castings. V. J. Zabek. *Canadian Metals*, v. 19, Nov. 1956, p. 44, 46, 50, 52.

Methods used in Canadian foundry include fluoroscope, radiography, and penetrant inspection.

2975* (French.) Magnetic Examination for the Detection of Defects in Specimens and the Sorting of Steel Bars. **L'examen magnétique pour la détection de défauts des pièces et le tri des barres d'acier.** M. Blanchard. *Centre de Documentation Sidérurgique, Circulaire d'Informations Techniques*, v. 13, no. 10, 1956, p. 2031-2038.

Influence of the defects in a metal specimen on the magnetic field. Production of magnetic fields. Use of cycles of differential permeability in sorting steel bars. Survey of various apparatus and applications.

2976* (German.) Gamma-Rays in Material Testing. **Die Verwendung von Gammastrahlen in der Werkstoffprüfung.** Gunther Münch. *Giesserei*, v. 43, no. 23, Nov. 8, 1956, p. 745-750.

Nondestructive testing with γ-rays. Apparatus, radiation protection, error considerations, and practical suggestions.

2977 Echo-Phantoms. Identification and Utilization in Flaw Detection. Mohammed A. Kassem. *Iron & Steel*, v. 29, Nov. 1956, p. 503-509.

The origin of formation of these echoes and their behavior; a proposed rational designation of all the echoes; a general echo chart for all solids. (To be concluded.)

2978 Quality Control of Powdered Metal Parts. G. L. Bachner. *Machinery (London)*, v. 89, Nov. 16, 1956, p. 1128-1130.

Control measures and tests used to ensure uniform, dependable products.

2979* (Italian.) Ultrasonic Tests. **Le prove mediante ultrasuoni.** E. Martin. *Metallurgia Italiana*, v. 48, no. 6, June 1956, p. 261-271.

A study of the principle, various methods used, and results in applying nondestructive ultrasonic material testing to railroad rolling stock in Germany.

2980 The Sorting of Scrap Metals and Alloys. E. Scheuer. *Metallurgical Reviews*, v. 1, pt. 3, 1956, p. 339-378 + 2 pages.

Methods and instruments for identification and sorting; sorting plan and practice; practical procedures for Al, Cu, Pb, Sn, Zn, and alloys.

2981 Quality Control Through Heat Treatment. Joseph J. Warga. *Metal Progress*, v. 70, Nov. 1956, p. 78-80.

Heat treatment procedures at an aircraft parts plane where consistent high quality is required.

2982* (French.) Recent Progress in Using Gamma Rays for Testing Castings. **Progrès récents dans le contrôle des moulages par les rayons gamma.** A. Blondel. *Métaux, Corrosion-Industries*, v. 31, no. 374, Oct. 1956, p. 396-406.

Light alloy specimens can be tested by artificial radioactive isotopes. Application of Co^{60}, In^{192}, and Tm^{192} and care of negatives in γ-ray exposures. Cesium^{137} and Ce^{144} as new possible sources of radioactive isotopes.

2983* (German and French.) Methods for the Rapid Identification of Copper Alloys. **Méthodes d'identification rapide des alliages cuivreux.** W. Stöckli. *Pro-Metal*, v. 9, no. 53, Oct. 1956, p. 735-738.

Nondestructive electrolytic methods for the rapid identification of Pb, Ni, Mn, and Al in Cu alloys.

2984* (German.) Practice in Non-Destructive Testing of Welded Tubes. **Erfahrungen bei der zerstörungsfreien Prüfung von Schweissnähten in Rohren.** H. -D. Weise. *Schweissen und Schneiden*, v. 8, no. 10, Oct. 1956, p. 355-358, 360-363.

Applications of X- and γ-ray testing, and ultrasonic methods.

2985 A Survey of Surface Finish Inspection Techniques. C. H. Good. *Steel Processing*, v. 42, Nov. 1956, p. 641-644, 648-650.

Available techniques; their limitations, advantages, and applications.

2986 Isotope Tracer Methods Developed in Great Britain. *Wire and Wire Products*, v. 31, Nov. 1956, p. 1337-1342.

Describes experiments made to determine die wear in drawing wire.

2987* (Russian.) A Method of Continuous Automatic Inspection of Materials With the Aid of a Low-Frequency Ultrasonic Defectoscope. **Metod avtomaticheskogo nepreryvnogo kontrolia materialov s pomoshch'iu ul'trazvukovogo defektoskopa.** D. I. Vasil'ev and N. F. Shustov. *Zavodskaia Laboratoriia*, v. 22, no. 10, Oct. 1956, p. 1186-1188.

Operation, design, and efficiency of the apparatus.

See also: **1743** (crack detection in aircraft structures); **2720** (ultrasonic testing of steel); **3255** (nondestructive tests on welds).

NUCLEAR PHYSICS, NUCLEONICS, AND RADIATION

2988* **Nuclear Reactors for Power.** George Leppert. *American Society of Naval Engineers, Journal*, v. 68, Nov. 1956, p. 633-646.

The designs currently under development in the U. S.

2989* **Measurement of Low-Level Radioactivity in Water.** Lloyd R. Setter and Abraham S. Goldin. *American Water Works Association, Journal*, v. 48, Nov. 1956, p. 1373-1379.

Permissible radioactivity levels; low-level counting; instrumentation; preparation of samples; precision of analysis.

2990* **Electric System for a Nuclear Reactor.** E. P. Peabody and D. S. Brereton. *Applications and Industry*, 1956, no. 27, Nov. 1956, p. 296-306.

Layout, power sources, system components, grounding, and control of system for pumping cooling water.

2991 Particle Accelerator Division Summary Report. John J. Livingood. *Argonne National Laboratory (U. S. Atomic Energy Commission)*, ANL-5630, Oct. 1956, 47 p. (UF767 Un3.1an Contin.)

General description of the 12.5 b.e.v. proton synchrotron and related equipment.

2992* (Russian.) Basic Characteristics of a Planned 50-60 BEV Alternating Gradient Proton Accelerator. **Osnovnye Kharakteristiki proektiruemoto yskoritelia protonov na 50-60 BEV s zhestkoi fokusirovkoi.** V. V. Vladimirskii, E. G. Komar, A. L. Mints, L. L. Gol'din, D. G. Koshkarev, N. A. Monoszon, C. Ia. Nikitin, S. M. Rubinskii, S. V. Skachkov, H. S. Strel'tsov, and E K. Tarasov. *Atomnaia Energiia*, 1956, no. 4, p. 31-33.

Basic parameters of a proton accelerator planned for the future. Critical energy will be eliminated by compensating with a system of magnets. The 120 sectors of magnets will not weigh more than 22,000 tons. Peak power 100,000 kv.-amp. Average radius 236 m.

2993* (Russian.) Vaporization of Metals by Fission Fragments. **Raspylenie metallov oskolkami deleniia.** F. S. Lapteva and B. V. Ershler. *Atomnaia Energiia*, 1956, no. 4, p. 63-66.

Measured number of atoms vaporized from the surface of a metal when a fission fragment or an α-particle is expelled. Measurements on U^{238} and Pu^{239}.

2994* (Russian.) Radiation Energy and Some Aspects of Its Action on Organisms. **Energiia izluchenii i nekotorye zakonomernosti ikh deistviia na biologicheskie obekty.** E. S. Shchepot'eva. *Atomnaia Energiia*, 1956, no. 4, p. 139-146.

Contemporary concepts regarding the physical-chemical mechanism of the action of ionizing radiations on living organisms. How time and area influence the energy effects in the organism.

2995 Atoms for Peace. David O. Woodbury. 271 p. 1956. Dodd, Mead & Co., New York. (TK9145 W85a)

Experiments, developments, and peaceful uses of the atom at the present time and possible uses in the future.

2996 The Transmission of Neutrons Through Ducts in Water. F. J. Shore and R. D. Schamberger. *Brookhaven National Laboratory (U. S. Atomic Energy Commission)*, BNL390 (T-74), Mar. 1956, 50 p. (UF767 Un3.1bn Contin.)

2997 Accumulation of Fission Products From U^{235}. A. K. Booth and D. Schweitzer. *Brookhaven National Laboratory (U. S. Atomic Energy Commission)*, BNL-407 (T-78), July 1956, 8 p. (UF767 Un3.1bn Contin.)

Simple and direct method of estimating amounts of fission products as a function of power level, flux, time of operation, and burn-up.

2998 The Coming Nuclear Industry. H. E. Anderson. *Chemical Engineering*, v. 63, Dec. 1956, p. 191-210.

Ores and concentrate; reprocessing spent fuel; using fission products and radioisotopes; disposing of wastes; reactor design and concepts; manpower and training; insurance and licensing.

2999* (Russian.) The Action of γ-Radiation of Radioactive Cobalt (Co^{60}) Upon Proteins and Amino Acids. **Deistvie γ-izlucheniia radioaktivnogo kobal'ta (Co^{60}) na belki i aminokisloty.** M. A. Khenokh and E. M. Lapinskaia. *Doklady Akademii Nauk SSSR*, v. 110, no. 1, Sept.-Oct. 1956, p. 125-128.

Experimental data on the effect of γ-radiation on solutions of albumin, casein, and gelatin and on solutions of glycine, alanine, and leucine.

3000* Development Trends for Atomic Power Plants Operating at High Temperatures. C. Keller and W. Winkler. *Escher Wyss News*, v. 29, May-Aug. 1956, p. 55-60.

3001 First Annual Report of the European Organization for Nuclear Research. *European Organization for Nuclear Research, Annual Report*, 1955, 65 p. (Pamphlet)

Research activities; proton synchrotron; synchro-cyclotron; scientific and technical services; site and buildings.

3002* (German.) Determination of Source Power of a Be-Photo- and Ra-Be Neutron Source. **Bestimmung der Quellstärke einer Be-Photo- und einer Ra-Be-Neutronenquelle.** C. von Planta and P. Huber. *Helvetica Physica Acta*, v. 29, no. 4, 1956, p. 375-400.

Attempts of revision of the work done by D. Hughes, F. Alder, and P. Huber on the same subject.

3003 Some Problems in the Maintenance of Nuclear Reactors. H. G. Davey. *Institution of Chemical Engineers, Transactions*, v. 34, no. 3, 1956, p. 204-222.

Remote work; direct work with temporary shielding; health physics control.

3004* The Use of the Pilot Ace for Testing a New Design of Proton Synchrotron. G. G. Alway. *Institution of Electrical Engineers, Proceedings*, v. 103, pt. B, Suppl., no. 1, Apr. 1956, p. 12-15.

3005 The Applications of Standards of Radioactivity. H. H. Seliger. *International Journal of Applied Radiation and Isotopes*, v. 1, no. 3, Nov. 1956, p. 215-232.

Application in determination of absolute efficiencies of detectors, determination of long half-lives, and determination of mean energies. Available isotopes, methods of routine assay; types of detectors; preparation of laboratory standards.

3006 Effect of Neutron Interaction of Criticality. G. W. Stuart. *Journal of Applied Physics*, v. 27, Nov. 1956, p. 1294-1300.

A general method to allow calculation of the critical buckling of an assemblage of fissile regions coupled by neutron leakage.

3007* (French.) Chemical Dosimetry of the Various Radiations of a Nuclear Reactor. **Dosimétrie chimique des différents rayonnements d'un réacteur nucléaire.** Jacques Pucheault. *Journal de Chimie Physique*, v. 53, no. 9, Sept. 1956, p. 705-713.

Dosimetry of the γ-rays; a method for measurement of neutron flux, for explanation of the action of ionizing radiations on certain systems of oxide reduction.

3008* Electronegative Impurities in Ionization Chambers. P. F. Little. *Journal of Electronics*, v. 2, ser. 1, Sept. 1956, p. 101-117.

3009* Non-Magnetic Mass Spectrometers. L. W. Kerr. *Journal of Electronics*, v. 2, ser. 1, Sept. 1956, p. 179-198.

Types of instruments; their performance and limitations.

3010 Neutron Cross-Section of Re^{185} and Half-Life of Re^{187}. R. R. Smith. *Journal of Inorganic and Nuclear Chemistry*, v. 3, Oct. 1956, p. 157-159.

The irradiation of a Re sample for 16 days in an average thermal neutron flux of 1.80×10^{14} neutrons per sq. cm. per sec. failed to produce observable quantities of second-order Re activities.

3011 Efficiency of 4π-Crystal-Scintillation Counting. I. Experimental Technique and Results. C. C. Smith, H. H. Seliger, and J. Steyn. **II. Dead-Time and Coincidence Corrections.** W. B. Mann and H. H. Seliger. *Journal of Research, National Bureau of Standards*, v. 57, Nov. 1956, p. 251-255, 257-264.

Technique was applied to the standardization of β emitting nuclides.

3012 The Scattering of Slow Neutrons by Hydrogeneous Moderators. T. J. Krieger and M. S. Nelkin. *Knolls Atomic Power Laboratory (U. S. Atomic Energy Commission)*, KAPL-1597, Aug. 1956, 40 p. (UF767 Un3.1kc Contin.)

Approximate methods for describing the scattering of slow neutrons by polyatomic gases. Simple analytic expressions for various cross sections.

3013 An Objective Study of Barrier Materials for Sodium-Water Systems. Leo F. Epstein. *Knolls Atomic Power Laboratory (U. S. Atomic Energy Commission)*, KAPL-M-LFE-16, Nov. 1956, 48 p. (UF767 Un3.1ka Contin.)

Future possibilities are Al, Cu, Ag, NaK, and Hg. Objective comparisons favor continued use of Hg until such time as heat exchanger redesign permits use of solid barrier materials.

3014 Radiations From the Atomic Industrial Forum. Karl F. Smith. *Metal Progress*, v. 70, Nov. 1956, p. 110-112.

Many of the uncertainties about construction materials, durability, and costs of atomic power plants will be resolved when some of the reactors now planned get into full-scale operation.

3015 Electronic Properties of Thorium, Uranium and Plutonium. I. Atomic Energy Levels. Guy W. Lehman. *North American Aviation, Inc. (U. S. Atomic Energy Commission)*, NAA-SR-1659, Nov. 1956, 19 p. (UF767 Un3.1na Contin.)

The low-lying one-electron term values and atomic wave functions. Effect of spin-orbit interaction.

3016 Nuclear Energy in Industry. J. G. Crowther. 168 p. 1956. George Newnes Ltd., London. (TK9145 C88n)

Tells the story of development culminating in the building of nuclear power stations. Describes role of radioisotope in industry, and its effect on techniques and processes.

3017* Problems of Liquid-Metal-Fuelled Reactors. I. B. R. T. Frost. *Nuclear Engineering*, v. 1, Nov. 1956, p. 334-339.

Comparison with other reactor systems; types of liquid-metal fuel; fuel containments; applications of the fuels; breeder blankets; chemical processing; plant layout and performance.

3018* Differential Elastic Scattering of 14 MeV Neutrons in Lead, Mercury and Zinc. H. Nauta. *Nuclear Physics*, v. 2, Oct. 1956, p. 124-131.

Differential cross sections were measured in a ring geometry.

3019* Collective Nuclear Motion and the Effective Mass of a Nucleon. R. J. Blin-Stoyle. *Nuclear Physics*, v. 2, Oct. 1956, p. 169-172.

Indicates that the effective mass of a nucleon in a nucleus is approximately one-half the actual mass.

3020 Heavy-Water Production Methods. *Nuclear Power*, v. 1, May 1956, p. 9-16.

Survey of present and projected plants and concluding with suggestions on the form which future plants might take.

3021 Reactor Physics. I. Neutrons and Their Reactions With Matter. James F. Hill. *Nuclear Power*, v. 1, 1956, p. 32-38.

The atomic nucleus; neutron cross-sections; the fission process; chain reactions; thermal reactors.

3022* The Safety of Reactor Control Schemes. I-II. J. Walker. *Nuclear Power*, v. 1, Sept. 1956, p. 205-209; Oct. 1956, p. 263-265.

Protection of plant and personnel in the event of any fault condition. The kind of flux detectors that should be used and where they should be placed.

3023* Heat Recovery From Reactors. I-II. P. Chambadal and J. P. Roux. *Nuclear Power*, v. 1, Sept. 1956, p. 211-215; Oct. 1956, p. 266-269.

Possible ways of raising steam from a heterogeneous type of reactor. How these principles have been applied to the first French power reactors at Marcoule.

3024* U-233 Breeder—U-235 Converter Reactor. L. I. Katzin and B. I. Spinrad. *Nuclear Science and Engineering*, v. 1, Oct. 1956, p. 343-354.

A fluid-fuel-fluid-absorber thermal reactor for the production of U^{233}; conditions for maximum efficiency as a breeder.

3025* Evaluation of $\ln E_1/E_2$ for Resonance Neutrons in Uranium Lattices. F. L. Fillmore. *Nuclear Science and Engineering*, v. 1, Oct. 1956, p. 355-358.

The $\ln E/E_2=2.6$.

3026* Engineering Hot Channel Factors for Nuclear Reactor Design. B. W. LeTourneau and R. E. Grimble. *Nuclear Science and Engineering*, v. 1, Oct. 1956, p. 359-369.

3027* The Calculation of Maxwellian-Averaged Cross Sections for Resonance Absorbers. J. H. Smith. *Nuclear Science and Engineering*, v. 1, Oct. 1956, p. 370-373.

Average cross section is expressed by formulas which permit accurate and simple evaluation for a wide range of nuclear parameters.

3028* The Diffusion of Fission Krypton From Metallic Uranium. Myron B. Reynolds. *Nuclear Science and Engineering*, v. 1, Oct. 1956, p. 374-382.

3029* Fission Recoil Separation of Fission Products in Power Reactor Design. Richard Wolfgang. *Nuclear Science and Engineering*, v. 1, Oct. 1956, p. 383-390.

The various possible types of reactors using the recoil separation principle; a promising design.

3030* Measurement of Neutron Spectra of the Experimental Breeder Reactor. C. Eggler, C. M. Huddleston, V. E. Krohn, and G. R. Ringo. *Nuclear Science and Engineering*, v. 1, Oct. 1956, p. 391-408.

Neutron spectra at two positions in the core and two positions in the inner blanket were measured by means of beams extracted from these positions.

3031* Operational Experience With the Borax Power Plant. W. H. Zinn, H. Lichtenberger, M. Novick, G. K. Whitham, C. J. B. Zitek, J. G. Feldes, V. C. Hall, Jr., and R. O. Haroldsen. *Nuclear Science and Engineering*, v. 1, Oct. 1956, p. 420-437.

3032 Research Reactors for Export. *Nucleonics*, v. 14, Nov. 1956, p. 65-80.

A special report consisting of several papers on U. S. Government policies, selection and operation of reactors, and types of reactors available from manufacturers.

3033 Mockup Tests Determine How Test-Cell Voids Affect Reactivity. J. R. Bohannon, Jr. *Nucleonics*, v. 14, Nov. 1956, p. 92-95.

NETR reactor; test program; thermal curtains; fuel-loading effect; void tank; measurements.

3034 Solid Metal Hydrides as Reactor Moderators. H. M. McCullough and B. Kopelman. *Nucleonics*, v. 14, Nov. 1956, p. 146-153.

Neutron absorption, strength, and effect of radiation of several metal hydrides was studied to determine which were most suitable for reactor use.

3035 How Flow Patterns Affect Shield Design. George T. Dib. *Nucleonics*, v. 14, Nov. 1956, p. 154-156, 186.

Rod-like flow; mixed flow; applications.

3036 Magnetic Moment of the Neutron. V. W. Cohen, N. R. Corngold, and N. F. Ramsey. *Physical Review*, v. 104, ser. 2, Oct. 15, 1956, p. 283-291.

Production and detection of the neutron beam; neutron mirrors; the magnet; magnetic field measurements; R.F. system; R.F. transition loops; line shapes.

3037 Angular Distributions of the Gamma Rays From the Reaction $Na^{23}(p,\gamma)Mg^{24}$. F. W. Prosser, Jr., N. P. Baumann, D. K. Brice, W. G. Read, and R. W. Krone. *Physical Review*, v. 104, ser. 2, Oct. 15, 1956, p. 369-375.

3038 Nuclear Alignment of Co^{58}. David F. Griffing and J. C. Wheatley. *Physical Review*, v. 104, ser. 2, Oct. 15, 1956, p. 389-398.

By using a two-stage adiabatic demagnetization technique, Co^{58} nuclei were aligned in single crystals of (22.7% Cu -77.3% Zn) $K_2(SO_4)_2 \cdot 6H_2O$ containing a trace of Co.

3039 Nucleon Energy Levels in a Velocity-Dependent Potential. A. A. Ross, R. D. Lawson, and Hans Mark. *Physical Review*, v. 104, ser. 2, Oct. 15, 1956, p. 401-410.

3040 Effect of Proton-Proton Scattering on an Initial Longitudinal Spin Polarization. James E. Simmons. *Physical Review*, v. 104, ser. 2, Oct. 15, 1956, p. 416-418.

The Wolfenstein A parameter for proton-proton scattering is measured for three angles at an incident laboratory energy of 316 m.e.v.

3041 Photofission and Photoneutron Emission in Thorium and Uranium. J. E. Gindler, J. R. Huizenga, and R. A. Schmitt. *Physical Review*, v. 104, ser. 2, Oct. 15, 1956, p. 425-433.

Relative photofissionability of Th to U was found to be about 2.3 times greater at betatron energies of 7 to 8 m.e.v. than at 20 m.e.v. Also, evidence for bumps in the photofission excitation functions at about 6 m.e.v. was observed.

3042 Spallation-Fission Competition in Heaviest Elements; Helium-Ion-Induced Reactions in Plutonium Isotopes. Richard A. Glass, Robert J. Carr, James W. Cobble, and Glenn T. Seaborg. *Physical Review*, v. 104, ser. 2, Oct. 15, 1956, p. 434-447.

3043 Decay Scheme of Re^{188} and Rotational Bands of Daughter Nucleus W^{188}. S. Thulin, J. O. Rasmussen, C. J. Gallagher, Jr., W. G. Smith, and J. M. Hollander. *Physical Review*, v. 104, ser. 2, Oct. 15, 1956, p. 471-474.

The transition intensities suggest an assignment of $5/2^+$ to Re^{188}. New information on $M1$-$E2$ mixing ratios for some of the γ transitions is obtained.

3044 Spectral Diffusion in Magnetic Resonance. A. M. Portis. *Physical Review*, v. 104, ser. 2, Nov. 1, 1956, p. 584-588.

Electron spin-spin interaction is discussed for the case of strong hyperfine broadening.

3045 Cyclotron Resonance Experiments in Silicon and Germanium. R. N. Dexter, H. J. Zeiger, and Benjamin Lax. *Physical Review*, v. 104, ser. 2, Nov. 1, 1956, p. 637-644.

3046 Auger Ejection of Electrons From Molybdenum by Noble Gas Ions. Homer D. Hagstrum. *Physical Review*, v. 104, ser. 2, Nov. 1, 1956, p. 672-683.

Basic measurements of electron yield and energy distribution of ejected electrons were made for ions of kinetic energy in the rang 10 to 1000 e.v.

3047 Prompt Gamma Rays Accompanying the Spontaneous Fission of Cf^{252}. A. B. Smith, P. R. Fields, and A. M. Friedman. *Physical Review*, v. 104, ser. 2, Nov. 1, 1956, p. 699-702.

3048 Decay Scheme of Mo^{91}. F. B. Smith, Jr., N. B. Gove, R. W. Henry, and R. A. Becker. *Physical Review*, v. 104, ser. 2, Nov. 1, 1956, p. 706-710.

3049 Nuclear Energy Levels of Os^{188}. V. R. Potnis. *Physical Review*, v. 104, ser. 2, Nov. 1, 1956, p. 722-727.

Rhenium-188; gamma-gamma coincidences; β-ray measurements; decay scheme of Re^{188} - Os^{188}.

3050 Rotational and Intrinsic Levels in Tm^{169} and Lu^{175}. E. N. Hatch, F. Boehm, P. Marmier, and J. W. M. DuMond. *Physical Review*, v. 104, ser. 2, Nov. 1, 1956, p. 745-752.

3051 Meson Production in Deuterium by 1.4-Bev Pions. V. P. Kenney. *Physical Review*, v. 104, ser. 2, Nov. 1, 1956, p. 784-794.

Reports on π-n and π-p interactions involved in pion-deuteron collisions at 1.4-Bev pion energy.

3052 High Energy Phenomena in Nuclear Emulsions. J. E. Naugle and P. S. Freir. *Physical Review*, v. 104, ser. 2, Nov. 1, 1956, p. 804-811.

Three interactions caused by primaries of charge equal to or greater than 2 and energy 10^4 b.e.v. per nucleon.

3053 Interaction Energy and Charge Exchange Between Helium Atoms and Ions. B. L. Moiseiwitsch. *Physical Society, Proceedings*, v. 69, no. 441A, Sept. 1956, p. 653-658.

Electronic energies for the $^2\Sigma_u$ and $^2\Sigma_g$ states of He_2^+. Cross section for charge exchange between He^+ ions and He atoms.

3054 Application of Variational Methods to the Theory of the Scattering of Slow Electrons by Hydrogen Molecules. H. S. W. Massey and R. O. Ridley. *Physical Society, Proceedings*, v. 69, no. 441A, Sept. 1956, p. 659-667.

3055 The Inelastic Scattering of Nucleons by the Surface Interaction. S. Yoshida. *Physical Society, Proceedings*, v. 69, no. 441A, Sept. 1956, p. 668-685.

3056 The Scattering of 9.6 MeV Protons by Mg. G. W. Greenlees and A. E. Souch. *Physical Society, Proceedings*, v. 69, no. 441A, Sept. 1956, p. 686-690.

Absolute differential cross sections are given for elastic and inelastic scattering for an angular range of 25-145°.

3057 A Study of Positive Pion Production in p-p Collisions at 383 MeV. Margaret H. Alston, A. V. Crewe, W. H. Evans, and G. von Gierke. *Physical Society, Proceedings*, v. 69, no. 441A, Sept. 1956, p. 691-704.

An 18 in. diffusion cloud chamber filled with 28 atmospheres of H in a magnetic field of 11,200 gauss is used to investigate the production of π^0-mesons.

3058 The Proton Gamma Angular Correlations in the $^{29}Si(d,p\gamma)^{29}Si$ Stripping Reaction. K. W. Allen, B. Collinge, B. Hird, B. C. Maglić, and P. R. Orman. *Physical Society, Proceedings*, v. 69, no. 441A, Sept. 1956, p. 705-712.

Angular correlation in the plane of scattering was in agreement with the simple stripping hypothesis, but measurements in a plane perpendicular to the direction of the absorbed neutron showed significant anisotropy.

3059 Physics of Radiology. Harold F. Batho. v. I-XXIII. 367 p. 1955. British Columbia Cancer Institute, Vancouver, Canada. (RC78 B32p Over.)

Generation, physics, and biological applications of radiant energy.

3060 Research in the Effects and Influences of the Nuclear Bomb Test Explosions. v. I-II. 1824 p. 1956. Japan Society for the Promotion of Science, Tokyo. (QH652 J27)

Nuclear explosion radiation studies in fields of physics, chemistry, meteorology, genetics, agriculture, fisheries science, economics, and medical science.

3061 Broad-Range Magnetic Spectrograph. C. P. Browne and W. W. Buechner. *Review of Scientific Instruments*, v. 27, Nov. 1956, p. 899-907.

Design, construction, testing, and operation of device for precise measurement of the energies and intensities of charged particles from nuclear reactions. Plots of dispersion, magnification, aberration, and calibration.

3062 High-Current Ion Injector. William A. S. Lamb and Edward J. Lofgren. *Review of Scientific Instruments*, v. 27, Nov. 1956, p. 907-909.

Injector is capable of continuous currents of protons or deuterons of ¾ amp. at 100 kv. or pulsed currents of 2 amp. at a 20% duty cycle.

3063 Negative Pressure Isopentane Bubble Chamber. Irwin A. Pless and Richard J. Plano. *Review of Scientific Instruments*, v. 27, Nov. 1956, p. 935-937.

All glass construction gives chamber comparatively long sensitive time and allows use of 90° stereophotography with consequent advantages in speed and accuracy of analysis.

3064 Achromatic Beam Translation Systems for Linear Accelerators. K. L. Brown. *Review of Scientific Instruments*, v. 27, Nov. 1956, p. 959-963.

3065 Adiabatic Coupling Between Electronic and Nuclear Motion in Molecules. A. Dalgarno and R. McCarroll. *Royal Society, Proceedings*, v. 237, ser. A, Nov. 6, 1956, p. 383-394.

Attention is devoted to configurations in which the nuclei are separated by large distances.

3066 Uniqueness of Solutions of the Bethe-Salpeter Equation for Scattering. S. Mandelstam. *Royal Society, Proceedings*, v. 237, ser. A, Nov. 20, 1956, p. 496-512.

Equation for nucleon-nucleon scattering is soluble for states of all angular momentum, parity, and isotopic spin only if $g^2/4\pi$ is less than $^1/6\pi$. Equation for meson-nucleon scattering is soluble for all values of the coupling constant.

3067 Fission By-Products to Transform Chemistry. S. Jefferson and R. Roberts. *Times Review of Industry*, v. 10, new ser., Nov. 1956, p. 24-25, 27-28.

Appraisal of prospects in sterilization, agriculture, elastomers, and process reactions.

3068 The Neutron Total Cross Sections of Magnesium, Silicon, and Sulfur. R. M. Brugger and R. G. Fluharty. *U. S. Atomic Energy Commission, Research and Development Report*, IDO-16300, Aug. 1956, 6 p. (UF767 Un3.1id Contin.)

3069* (German.) Light Excitation Produced by the Impact of Helium With Light and Heavy Hydrogen. **Lichtanregung beim Stoss von Helium mit leichtem und schwerem Wasserstoff.** W. Hanle and G. A. Voss. *Zeitschrift für Naturforschung*, v. 11a, no. 10, Oct. 1956, p. 857-862.

Light excitation produced by He ions is the same in light as in heavy H, and probably is due to recombination of He.

See also: **1769** (sterilization by radiation); **1792** (irradiated protein solutions); **1855** (reactor cooling towers); **2115** (radiation damage to coatings and gaskets); **2318** (atomic power in Australia); **2541** (production of uranium fuel elements); **2542** (processing nuclear fuels); **2553** (alloys for reactors); **2852** (cutting radioactive metal); **2930** (pile-irradiated uranium-base alloys); **3088** (liquid alkali metals); **3182** (treatment of radioactive wastes); **3184** (radiation fall out); **3189** (disposal of radioactive wastes); **3210** (space heating with the atom).

OPERATIONS RESEARCH AND MANAGEMENT ENGINEERING

3070* Monte Carlo Methods and Industrial Problems. W. Neil Jessop. *Applied Statistics*, v. 5, Nov. 1956, p. 158-165.

Essentials of the method are illustrated by examples of a relatively simple kind from an industrial background.

3071* The Allocation of Scarce Materials Between Products. Noel Williams. *Applied Statistics*, v. 5, Nov. 1956, p. 166-176.

Principles of linear programming; application to problems of material allocation.

3072 Automation and Operations Research. O. R. in the Planning and Control Functions of Management. E. E. Sorensen. *Chemistry in Canada*, v. 8, Nov. 1956, p. 33-37.

Makes the operations research approach to planning and control by establishing so-called informational loops based on the five steps of logical thinking: communication, recording, analysis, synthesis, and communication.

3073 Executive Personality and Job Success. 35 p. 1948. American Management Assn., New York. (Hd28 Am35p Vis.)

Includes papers on supervisory practices and employee morale and the human element in productivity.

3074* Management Science and Operations Research. Merrill M. Flood. *Journal of Engineering Education*, v. 47, Oct. 1956, p. 106-112.

Indicates the broad outlines of scientific knowledge and engineering skills that seem to be most useful now to practitioners of operations research.

3075 Engineering Organization for Profitable Performance. Philip Marvin. *Machine Design*, v. 28, Nov. 29, 1956, p. 82-85.

The four steps essential in the building of an effective engineering organization.

3076* Mathematical Aspects of Scheduling Theory. Richard Bellman. *Society for Industrial and Applied Mathematics, Journal*, v. 4, Sept. 1956, p. 168-205.

Analytic and computational techniques used to describe a number of representative problems in the field of scheduling.

3077* Testing and Training Engineers for Creative Ability. Robert W. Kubasta. *Tool Engineer*, v. 37, Dec. 1956, p. 73-77.

A blueprint for engineering executives and administrators wishing to cultivate a greater creativity.

ORE AND MATERIALS BENEFICIATION

3078 Recovery of Uranium From Shales. v. I-II. R. A. Ewing, G. A. Lutz, and A. E. Bearse. *Battelle Memorial Institute (U. S. Atomic Energy Commission)*, BMI-JDS-210, Sept. 1949, 373 p. (UF767 U3b Contin.)

A condensation of results from 3-yr. of investigation, including two proposed recovery processes and production cost data.

3079 Reaction Zones in the Iron-Ore Sintering Process. R. D. Burlingame, Gust Bitsianes, and T. L. Joseph. *Industrial Heating*, v. 23, Nov. 1956, p. 2375-2376, 2390.

To investigate changes that precede the formation of sinter, sintering zones were arrested after they progressed part way through the bed. When the sintering zone reached the half-way point, as indicated by the sudden increase in the hot junction temperature, the charge was quenched.

3080 Predicting Size Distribution in Classifier Products. I. The Mechanism of Settling Pool Classification and Its Limitations. II. A Method for Calculating Countercurrent Classification. E. J. Roberts and E. B. Fitch. *Mining Engineering*, v. 8; *American Institute of Mining and Metallurgical Engineers, Transactions*, v. 205, Nov. 1956, p. 1113-1120.

Excellent elimination of third critical mesh particles and finer ones may be obtained in a countercurrent classifications series where all stages separate at the same mesh, but elimination of first and second criticals is inherently limited.

3081 Coal Preparation at the Jones & Laughlin Vesta Mines. J. A. Glunt and J. R. Dawson. *Mining Engineering*, v. 8; *American Institute of Mining and Metallurgical Engineers, Transactions*, v. 205, Dec. 1956, p. 1205-1209.

Operation of new preparation plant; liquid-solid cyclones; heated screening.

3082 (French.) Report of Activity Up to December 31, 1954. **Rapport d'activité arrêté au 31 Décembre 1954.** 362 p. 1956. L'Institut de Recherches de la Sidérurgie (IRSID), Saint-Germain-en-Laye, France. (TN602 In7p Vis.)

The situation of the IRSID and the activities of the Metallurgical Study Center (CESSID) at the end of 1954. The following studies were of special interest: ore enrichment; gravity separation, pneumatic separation, high and low intensity magnetic separation and applications; the making of cast iron with different cokes; speed and mechanism of reaction in metallurgy; variation of the resilience distribution in soft steels.

3083 Beneficiation Studies of Nickeliferous Ores From the Shamrock Mine, Jackson County, Oreg., and the Congress Mine, Ferry County, Wash. J. E. Shelton. *U. S. Bureau of Mines, Report of Investigations* 5261, Oct. 1956, 8 p. (TN21 Un3r)

Bulk sulfide flotation to reduce the weight of product, before hydrometallurgical or pyrometallurgical treatment, offers the best method for utilizing the material.

3084 A Mineral-Dressing Study of Manganese Deposits of West-Central Arkansas. M. M. Fine and D. W. Frommer. *U. S. Bureau of Mines, Report of Investigations* 5262, Oct. 1956, 21 p. (TN21 Un3r)

In most instances, a too-intimate association of Mn oxides and gangue is conducive to low grade, low recovery, or both, so that mechanical concentration processes do not promise much for this district.

3085 Development of a Chloride Volatilization Process for Manganese Ores From Aroostook County, Maine: Progress Report. R. T. MacMillan and T. L. Turner. *U. S. Bureau of Mines, Report of Investigations* 5281, Oct. 1956, 31 p. (Tn21 Un3r)

Manganese chloride volatilization with gaseous hydrochloric acid; conversion of chloridization product to oxide form; recovery of hydrochloric acid from hydrolysis step for recycling to chloridizing furnace; test on controlling Mn-Fe ratio in product; solubility study.

PHYSICS

3086* Modified Correlation Formulae for the Heat Transfers by Natural and by Forced Convection From Horizontal Cylinders. B. G. Van Der Hegge Zijnen. *Applied Scientific Research*, v. 6, sec. A, nos. 2-3, 1956, p. 129-140.

3087 Laminar-Free-Convection Heat Transfer From the Outer Surface of a Vertical Circular Cylinder. E. M. Sparrow and J. L. Gregg. *ASME, Transactions*, v. 78, Nov. 1956, p. 1823-1829.

3088* (Russian.) Thermo-Physical and Heat Transfer Properties of Liquid Alkali Metals. **Teplootdacha i teplofizicheskie svoistva rasplavlennykh shchelochnykh metallov.** I. I. Novikov, A. N. Solov'ev, E. M. Khabakhpasheva, V. A. Gruzdev, A. I. Pridantsev, and M. Ia. Vasenina. *Atomnaia Energiia*, 1956, no. 4, p. 92-106.

Studies on liquid Na and K, liquid and eutectic mixture of Na and K. Their use as heat exchangers in atomic energy installations. Methods of measuring their viscosity, temperature conductivity, and density. Results of such measurements over a wide range of temperatures.

3089 Measurement of Acoustical Parameters of Materials at Ultrasonic Frequencies With Aid of an Impulse Tube. N. S. Ageeva. *Henry Brutcher Translation No.* 3769, 22 p. (From *Akusticheskii Zhurnal*, v. 1, no. 2, 1955, p. 110-120.) Henry Brutcher, Altadena, Calif.

Measures the complex coefficient of reflection from a plane surface by the use of ultrasound, with the aid of an "impulse tube" hydroacoustical installation.

3090 Conference on Physical Acoustics and Ultrasound Held in Moscow, March 3-7, 1955. *Henry Brutcher Translation No.* 3777, 27 p. (From *Akusticheskii Zhurnal*, v. 1, no. 2, 1955, p. 182-190.) Henry Brutcher, Altadena, Calif.

Abstracts of forty-five conference reports dealing with fundamentals and diverse practical applications of sound and ultrasound in fields such as chemistry, biology, medicine, agronomy, and testing of materials.

3091 Fundamental Concepts of Matter in the Solid State. M. J. P. Musgrave. Paper from "Chemical Engineering Practice". v. II. Academic Press, p. 1-67. (TP155 C42e)

Shows how the variations of the physical properties of solids, both in degree and kind, are closely related to the fundamental crystal structure.

3092 Significance of Mechanical Properties and Their Measurement. P. G. Forrest and M. J. P. Musgrave. Paper from "Chemical Engineering Practice". v. II. Academic Press, p. 68-112. (TP155 C42e)

The principal means of structure determination. Tests and measurements made on solids to assess mechanical properties and to relate these properties to structure.

3093* (Russian.) Reflection of Sound by a Thin Rod in Water. **Otrazhenie zvuka tonkim sterzhnem v vode.** L. M. Liamshev and S. N. Rudakov. *Doklady Akademii Nauk SSSR*, v. 110, no. 1, Sept.-Oct. 1956, p. 48-51.

A study of the nonspecular reflection of sound by thin Cu, steel, and Al rods under water.

3094* (German.) New Magnetic Materials and Their Role in Engineering Development. **Neue magnetische Werkstoffe und ihre Bedeutung für die technische Entwicklung.** Klaus Sixtus. *ETZ, Elektrotechnische Zeitschrift*, v. 77, Ausgabe A, no. 21, Nov. 1956, p. 790-799.

Review of the development of new magnetic materials, their application and advantages.

3095 Irradiation Colours and Luminescence. A Contribution to Mineral Physics. Karl Przibram. (Translated and revised from the German by Karl Przibram and John Espenett Caffyn.) 332 p. 1956. Pergamon Press, London. (QE364 P95i)

An up-to-date critical survey describing the colorations and luminescence produced by exposure to ionizing radiation of both natural and synthetic crystals.

3096 Anisotropic Color Centers in α Quartz. I. Smoky Quartz. Alvin J. Cohen. *Journal of Chemical Physics*, v. 25, Nov. 1956, p. 908-914.

Two visible color centers studied are undoubtedly associated with an impurity which appears to be Al. This impurity must be located substitutionally in the quartz lattice.

3097 Effect of Crystal Structure Upon the Luminescence of Manganese-Activated Lithium Titanate. M. R. Lorenz and J. S. Prener. *Journal of Chemical Physics*, v. 25, Nov. 1956, p. 1013-1015.

3098 Capillary Condensation in Single Pores. R. M. Barrer, N. McKenzie, and J. S. S. Reay. *Journal of Colloid Science*, v. 11, Aug.-Oct. 1956, p. 479-495.

The processes of filling and emptying single capillaries were quantitatively considered for a wetting liquid for capillaries in the form of cones, wedges, double cones, hollow spherical caps, cylinders with hemispherical ends, and the pore space between solid cylinders and spheres.

3099* Luminescence of the Sulphide Phosphors. P. F. Browne. *Journal of Electronics*, v. 2, ser. 1, Sept. 1956, p. 154-165.

The numerous luminescence bands of ZnS, CdS, CdSe, HgS arise from the breaking of a double covalent bond at lattice vacancies. This explanation may apply to other luminescent compounds.

3100* Luminescence in ZnS: Cu, Cl Phosphors at High Cu Concentration. T. B. Tomlinson. *Journal of Electronics*, v. 2, ser. 1, Sept. 1956, p. 166-178.

3101 Thermoelasticity and Thermal Shock. Martin Lessen. *Journal of the Mechanics and Physics of Solids*, v. 5, Nov. 1956, p. 57-61.

Relevant equations for a thermoelastic solid are derived from thermodynamic principles. The problem of thermal shock is expressed as a perturbation expansion.

3102 Minimum Principles of Piecewise Linear Isotropic Plasticity. P. G. Hodge, Jr. *Journal of Rational Mechanics and Analysis*, v. 5, Nov. 1956, p. 917-938.

A theory of plasticity is considered in which the yield function is a piecewise linear function of the stresses, the flow law is based on the plastic potential, and the strain-hardening is isotropic and linear.

3103 Metastable Ions of the Noble Gases. Homer D. Hagstrum. *Physical Review*, v. 104, ser. 2, Oct. 15, 1956, p. 309-316.

Ions are produced by a single electron impact with the parent normal atom. The ratio of cross sections for formation of the metastable and normal ions for A, Kr, and Xe was determined as a function of bombarding electron energy.

3104 Energy of a Many-Particle System. W. B. Riesenfeld and K. M. Watson. *Physical Review*, v. 104, ser. 2, Oct. 15, 1956, p. 492-510.

Considers the problem of determining the energy of a quantum mechanical system of N particles interacting through known two-body forces.

3105 Temporal Growth of Ionization in Gases. C. Grey Morgan. *Physical Review*, v. 104, ser. 2, Nov. 1, 1956, p. 566-571.

Considers temporal growth of current in uniform electric fields in H at various pressures between parallel plate Cu electrodes in the nonsteady state.

3106 Absorption and Emission Spectra of Silicon and Germanium in the Soft X-Ray Region. D. H. Tomboulian and D. E. Bedo. *Physical Review*, v. 104, ser. 2, Nov. 1, 1956, p. 590-597.

3107 Paramagnetic Resonance Investigation of Irradiated KCl Crystals Containing U-Centers. C. J. Delbecq, B. Smaller, and P. H. Yuster. *Physical Review*, v. 104, ser. 2, Nov. 1, 1956, p. 599-604.

3108 Anisotropy Constants and *g* Value of Nickel Ferrite. Daniel W. Healy, Jr. and Richard A. Johnson. *Physical Review*, v. 104, ser. 2, Nov. 1, 1956, p. 634-636.

3109 Cosmic Time and the Field Equations of General Relativity. Wallace Kantor and George Szekeres. *Physical Review*, v. 104, ser. 2, Nov. 1, 1956, p. 831-834.

Examines possible alternatives to field equations derived from a Lagrangian density.

3110 The Absorption of Ultrasonic Waves in a Number of Pure Liquids Over the Frequency Range 100 to 200 Mc/s. E. L. Heasell and J. Lamb. *Physical Society, Proceedings*, v. 69, no. 441B, Sept. 1956, p. 869-877.

Measurements on 94 liquids at 25 C.

3111 An X-Ray Study of the Structure of a Sodium Chloride Crystal Grown by the Kyropoulos Method. D. A. Jones and T. Smith. *Physical Society, Proceedings*, v. 69, no. 441B, Sept. 1956, p. 878-884.

The crystallites are axial in form and their major misorientation corresponds to a rotation about the boule axis, varying little with growth rates between 0.04 and 0.6 cm. per hr., though the cross-sectional area decreases.

3112 A General Theory of the Surface Friction of Solids. C. Rubenstein. *Physical Society, Proceedings*, v. 69, no. 441B, Sept. 1956, p. 921-933.

Theory is based on the assumptions that the adhesion theory of friction is valid and that the asperities, at which contact occure, deform according to the law stress α (strain)^x.

3113 Halide Activated Halide Phosphors. J. W. Elder. *Physical Society, Proceedings*, v. 69, no. 441B, Sept. 1956, p. 934-938.

New absorption peaks were observed in the long wave length tail of the fundamental absorption band of pure alkali halides, when a small amount of another alkali halide is added as an impurity.

3114* Analysis of Ferromagnetic and Antiferromagnetic Second-Order Transitions. J. A. Hofmann, A. Paskin, K. J. Tauer, and R. J. Weiss. *Physics and Chemistry of Solids*, v. 1, Sept.-Oct. 1956, p. 45-60.

Magnetic specific-heat curves were deduced for a number of ferromagnetic and antiferromagnetic materials from their total specific-heat curves.

3115* Absorption Spectra of Impurities in Silicon. I. Group-III Acceptors. E. Burstein, G. Picus, B. Henvis, and R. Wallis. **II. Group-V Donors.** G. Picus, E. Burstein, and B. Henvis. *Physics and Chemistry of Solids*, v. 1, Sept.-Oct. 1956, p. 65-81.

3116* Energy Band Structure in *P*-Type Germanium and Silicon. E. O. Kane. *Physics and Chemistry of Solids*, v. 1, Sept.-Oct. 1956, p. 82-99.

3117* Paramagnetic Resonance Absorption of Mn^{++} in Single Crystals of Zincblende. L. M. Matarrese and Chibiro Kikuchi. *Physics and Chemistry of Solids*, v. 1, Sept.-Oct. 1956, p. 117-127.

3118 Magnetic Shielding With Multiple Cylindrical Shells. W. G. Wadey. *Review of Scientific Instruments*, v. 27, Nov. 1956, p. 910-916.

Formulas for computation of the shielding ratio for any number of concentric shells of contemporary high-permeability materials in any combination. Sample designs.

3119 The Thermal Conductivity of Dielectric Crystals: The Effect of Isotopes. R. Berman, E. L. Foster, and J. M. Ziman. *Royal Society, Proceedings*, v. 237, ser. A, Nov. 6, 1956, p. 344-354.

Conductivities of TiO_2, KCl, LiF, and of three types of diamond below room temperature.

3120 Isotope Shifts and Hyperfine Structure in the Atomic Spectrum of Cadmium. H. G. Kuhn and S. A. Ramsden. *Royal Society, Proceedings*, v. 237, ser. A, Nov. 20, 1956, p. 485-495.

Isotope shifts in the spark line λ 4416 of Cd are accurately measured by means of single and double Fabry-Perot etalons and with the use of electro-magnetically enriched isotopes.

3121 The Influence of Dust Particles on the Contact of Solids. J. B. P. Williamson, J. A. Greenwood, and J. Harris. *Royal Society, Proceedings*, v. 237, ser. A, Nov. 20, 1956, p. 560-573.

The various possible methods of increasing the probability that direct contact will occur. General relations by means of which the behavior of two contacting solids under any given concentration of dust may be predicted.

3122 A Numerical Integration Technique for Computing the Mean Thermal Diffusion Coefficients. P. G. Roll and R.

S. Varga. *U. S. Atomic Energy Commission, Research and Development Report,* WAPD-TM-5, June 1956, 22 p. (UF767 Un3.1wa Contin.)

3123* (German.) A Classification of the Relaxation Phenomena in Crystals. **Klassifikation von Relaxationserscheinungen in Kristallen.** G. Falk and J. Meixner. *Zeitschrift für Naturforschung,* v. 11a, no. 10, Oct. 1956, p. 782-791.

A classification of internal variables was made, based on transformation properties in relation to the crystallographic group. Mechanical and relaxation phenomena in isotropic bodies.

3124* (German.) A Simple Theory on the Lowest States of Optical Excitation in Molecular Crystals. **Eine einfache Theorie der niedersten optischen Anregungszustände von Molekülkristallen.** Hans Christoph Wolf. *Zeitschrift für Naturforschung,* v. 11a, no. 10, Oct. 1956, p. 797-800.

A theory was established to determine the number of molecules in the unit crystal and the amount of interaction energy and the transition point in the unit molecule. It was applied to the naphthalene crystal.

3125* (German.) The Spin Wave Theory of Ferromagnetism. **Zur Spinwellentheorie des Ferromagnetismus.** Klaus Meyer. *Zeitschrift für Naturforschung,* v. 11a, no. 10, Oct. 1956, p. 865-873.

The excited states of a ferromagnetic crystal with only a valence electron per atom in the Heitler-London approximation can be described by a system of quasi-particles which belong to the Fermi-statistics. A variation method is also given.

3126* (German.) Determination of Velocity in Laval-Rays. **Geschwindigkeitsanalyse von Laval-Strahlen.** E. W. Becker and W. Henkes. *Zeitschrift für Physik,* v. 146, no. 3, 1956, p. 320-332.

The distributions of velocity of molecular rays from H and A and a mixture of both gases were examined by transit time, and the behavior of these distributions studied when a Laval-tube was used.

See also: **1828** (properties of $Sr.O.TiO_2$); **2251** (magnetic amplifiers); **2421** (technology of heat); **2432** (light scattering); **2821** (magnetic domains in Ni-Fe alloy); **3139** (heat transfer problems).

PLASTICS

3127* (German.) Polycarbonates, a Group of New Types of Thermoplastics. Production and Properties of Aromatic Polyesters of Carbonic Acid. **Polycarbonate, eine Gruppe neuartiger thermoplastischer Kunststoffe. Herstellung und Eigenschaften aromatischer Polyester der Kohlensäure.** H. Schnell. *Angewandte Chemie,* v. 68, no. 20, Oct. 21, 1956, p. 633-640.

Polyesters of carbonic acid are obtained from 4,4'-dihydroxy-diphenyl-alkanes by reaction with phosgene.

3128 Progress Report on Fission Products Utilization. IX. Studies on Radiation-Induced Graft Copolymerization and Solid State Polymerization. D. S. Ballantine, P. Colombo, A. Glines, B. Manowitz, and D. J. Metz. *Brookhaven National Laboratory (U. S. Atomic Energy Commission),* BNL-414 (T-81), Oct. 1956, 14 p. (UF767 Un3.1bn Contin.)

Preparation of graft copolymers by irradiation of a polymer in the presence of a monomer with Co-60-γ-rays. Kinetic aspects and physical properties.

3129 Improved Techniques for the Production of Polymers. E. A. Cosgrave. *Canadian Chemical Processing,* v. 40, Nov. 1956, p. 44, 46-48.

New acrylonitrile fibers; improved dye sensitivities; new curing techniques; polymeric polyethers; improved polyesters.

3130* (German.) Developments and Requirements in the Field of Single-Screw Extruders. **Entwicklungen und Wünsche auf dem Gebiet der Einschnecken-Strangpressen.** K. Stoeckhert. *Chemische Industrie,* v. 8, no. 10, Oct. 1956, p. 499-502.

Concludes with suggestions regarding changes or improvements in extruder designs.

3131* (French.) A New Class of Plastics: Grafted Copolymers. **Une nouvelle classe de matières plastiques: les copolymères greffés.** Adolphe Chapiro. *Chimie & Industrie,* v. 76, no. 4, Oct. 1956, p. 754-757.

Preparation of so-called "grafted" compounds by means of ionizing radiations.

3132 Design and Engineering of Plastic Materials of Construction. O. H. Fenner and R. P. Whittier. *Corrosion,* v. 12, Dec. 1956, p. 611-616.

Typical applications; data on maximum working pressure and tensile strength, and maximum working temperature-pressure relationship for plastic and metal pipe.

3133 Organic Corrosion With Special Reference to Synthetic Plastic Materials. *Corrosion Technology,* v. 3, Nov. 1956, p. 349-354.

Tests with polythene and rubber hydrochloride sheet show that such materials have extremely limited applications in the wrapping of metal work.

3134* (Russian.) The Synthesis and Polymerization of Vinyl Derivatives of the Furan and Thiophene Series. **Sintez i polimerizatsiia vinil'nykh proizvodnykh riadov furana i tiofena.** I. V. Andreeva and M. M. Koton. *Doklady Akademii Nauk SSSR,* v. 110, no. 1, Sept.-Oct. 1956, p. 75-78.

A study of the effect of increasing the number of benzene rings in vinyl derivatives of the furan and thiophene series on their ability to polymerize and on the properties of resulting polymers.

3135* (Russian.) Polymerization Kinetics of Acrylic Acid and Methacrylic Cyanide in Aqueous Solution in the Presence of Cumene Hydroperoxide. **Kinetika polimerizatsii akrilovoi kisloty i nitrila metakrilovoi kisloty v vodnom rastvore v prisutstvii gidroperekisi kumola.** T. M. Gritsenko and S. S. Medvedev. *Doklady Akademii Nauk SSSR,* v. 110, no. 2, Sept. 11, 1956, p. 235-237.

Mechanism of polymerization of monomers containing CH-groups is different from the polymerization initiation of similar monomers in which the CH-group H atom is substituted by a methyl group.

3136 The Photo-Elastic Properties of Cross-Linked Amorphous Polymers. I. Natural Rubber and Gutta-Percha. II. Polythene and Polymethylene. D. W. Saunders. *Faraday Society, Transactions,* v. 52, Oct. 1956, p. 1414-1431.

3137 The Polymerization of Methyl Methacrylate in the Presence of a Nitric Ester. J. A. Hicks. *Faraday Society, Transactions,* v. 52, Nov. 1956, p. 1526-1533.

Application of standard polymerization techniques to the system, methyl methacrylate + ethylene glycol dinitrate, results providing first direct evidence that the primary step in thermal decomposition of this nitric ester involves production of free radicals capable of initiatng polymerization of the monomer.

3138 Plastics in Patternmaking. Paul von Colditz and Harry A. Burton. *Foundry,* v. 84, Dec. 1956, p. 98-103.

Advantages of plastic patterns and coreboxes and how they are made are described.

3139* Relaxation Methods and Heat Transfer. II. N. H. Langton. *Industrial Chemist,* v. 32, Nov. 1956, p. 480-484.

Solution of heat transfer problems related to hot molding of rubbers and plastics.

3140* (Dutch.) Physical Properties and Chemical Structure of Fiber and Film Forming Polymers. **Fysische eigenschappen en chemische structuur van vezel- en filmvormende polymeren.** André Conix. *Industrie Chimique Belge,* v. 21, no. 9, Sept. 1956, p. 901-918.

A survey permits the establishment of a relation between the chemical structure and physical properties of synthetic polymers.

3141 Fiberglas-Reinforced Plastic as a Rocket Structural Material. K. Dexter Miller and Steven M. Breslau. *Jet Propulsion,* v. 26, Nov. 1956, p. 969-972.

Processes for production of rocket cases.

3142 Permeation of Polychlorotrifluoroethylene Films by Nitric Acid. F. H. Garner, S. R. M. Ellis, and J. C. Gill. *Journal of Applied Chemistry,* v. 6, Sept. 1956, p. 407-412.

A study of some factors influencing the permeation rate of concentrated nitric acid through a plastic film.

3143 Electrostatic Contributions to Thermodynamic Functions of Systems Containing Polymeric Ions. Frank E. Harris and Stuart A. Rice. *Journal of Chemical Physics*, v. 25, Nov. 1956, p. 955-964.

Electrostatic free energy is evaluated using a model which preserves the inhomogeneous charge distribution of the polyion.

3144 Infrared Spectra of Polymers. I. Effect of Crystallinity on the Infrared Spectrum of Polyethylene and on the Infrared Spectra of Nylon 6 and Nylon 11. Marvin C. Tobin and Matthew J. Carrano. *Journal of Chemical Physics*, v. 25, Nov. 1956, p. 1044-1052.

3145 Light-Scattering Measurements on Some Branched Polystyrenes. M. H. Jones, H. W. Melville, D. W. Ovenall, F. W. Peaker, and W. G. P. Robertson. *Journal of Colloid Science*, v. 11, Aug.-Oct. 1956, p. 508-518.

Measurements on branched polystyrenes prepared by a bromination growth technique designed to produce polymers of known structure.

3146* Copolymerization of Vinyl Siloxanes With Organic Vinyl Monomers. Ronald M. Pike and Donald L. Bailey. *Journal of Polymer Science*, v. 22, Oct. 1956, p. 55-64.

3147* Young's Modulus of Semicrystalline Polymers. F. Bueche. *Journal of Polymer Science*, v. 22, Oct. 1956, p. 113-122.

Measurement of crystallinity and Young's modulus for two widely different polyethylenes at temperatures between 30 and 140 C are reported. The theory presented is also applied to data on natural rubber.

3148* Polymerization of Methyl Methacrylate in Polyisoprene Solutions. P. W. Allen and F. W. Merrett. *Journal of Polymer Science*, v. 22, Nov. 1956, p. 193-201.

Polymerization in solutions of rubber, gutta-percha, and chicle gutta results in product which can be separated by fractional extraction and precipitation into free polyisoprene, free polymethyl methacrylate, and a compound of the two polymers.

3149* Sound Velocity, Young's Modulus and Transition Temperature in Polythenes With Different Degrees of Crystallinity. M. Baccaredda and E. Butta. *Journal of Polymer Science*, v. 22, Nov. 1956, p. 217-222.

3150* Infrared Spectra of High Polymers. V. Polyvinyl Alcohol. S. Krimm, C. Y. Liang, and B. M. Sutherland. *Journal of Polymer Science*, v. 22, Nov. 1956, p. 227-247.

The proposed assignments suggest a new interpretation of the 1326-1446 $cm.^{-1}$ doublet, that these bands arise from mixed CH and OH in plane bending vibrations.

3151* Pyrolysis of Polyacrylonitrile. W. J. Burlant and J. L. Parsons. *Journal of Polymer Science*, v. 22, Nov. 1956, p. 249-256.

The predominant gaseous products are HCN and NH_3. Rates of formation were measured.

3152* Nature of the End Groups in Polystyrene Prepared Using Benzoyl Peroxide as Sensitizer. J. C. Bevington and C. S. Brooks. *Journal of Polymer Science*, v. 22, Nov. 1956, p. 257-261.

3153* Equilibria Between Polycapramide and Water. I. Osamu Fukumoto. *Journal of Polymer Science*, v. 22, Nov. 1956, p. 263-270.

Relationships between temperature, solubility of water, and its vapor pressure.

3154* Electron Exchange Polymers. VIII. The Redox Potentials of Polymeric Hydroquinones. *Journal of Polymer Science*, v. 22, Nov. 1956, p. 271-290.

3155* Polyvinyl Trifluoroacetate. Howard S. Haas, Euguene S. Emerson, and Norman W. Schuler. *Journal of Polymer Science*, v. 22, Nov. 1956, p. 291-302.

Polymerization, properties, and copolymerization; branching; hydrolysis to polyvinyl alcohol; optical properties of stretched PVTA.

3156* Pyrolysis of Crosslinked Styrene Polymers. F. H. Winslow and W. Matreyek. *Journal of Polymer Science*, v. 22, Nov. 1956, p. 315-324.

The effect of network density on pyrolysis of polymers and copolymers of styrene, divinylbenzene, and trivinylbenzene.

3157* Studies on Heterogeneous Polymeric Systems. E. H. Merz, G. C. Claver, and M. Baer. *Journal of Polymer Science*, v. 22, Nov. 1956, p. 325-341.

The physical and morphological properties of heterogeneous mixtures of polystyrene with styrene-butadiene copolymers.

3158* (Russian.) Studies on the Kinetics and Mechanism of the Thermal Decomposition of Chlorinated Vinyl Polymers. **Issledovanie kinetiki i mekhanizma termicheskogo raspada khlorsoderzhashchikh vinilovykh polimerov. I.** Procedures and the Results for Polyvinyl Chloride. **Metodika i rezul'taty dlia polivinilkhlorida. II.** Results for Polyvinyl Chloride, Vinylidene Chloride and Vinyl Chloride Copolymers, and Chlorinated Polyvinyl Chloride. **Rezultaty dlia polivinilidenkhlorida, sopolimera vinilidenkhlorida i vinilkhlorida i khlorirovannogo polivinilkhlorida.** N. V. Mikhailov, V. S. Klimenkov, and L. G. Tokareva. *Kolloidnyi Zhurnal*, v. 18, no. 5, Sept.-Oct. 1956, p. 578-582, 597-603.

Study is based on measurements of the cleavage of HCl between 150 and 170 C.

3159* (English.) **Copolymerization of Allylidene Diacetate and Styrene, and the Chemical Reactions of the Saponified Copolymer.** Takeo Saegusa and Ryohei Oda. *Kyoto University, Institute for Chemical Research, Bulletin*, v. 34, Mar. 1956, p. 56-64.

3160* (German.) Initiation of Polymerization by Polyfunctional Macromolecular N-Nitroso-N-Acetylarylamines and Diazoamino Compounds. **Die Initiierung der Polymerisation durch polyfunktionelle makromolekulare N-Nitroso-N-acetylarylamine und Diazoaminoverbindungen.** W. Hahn and A. Fischer. *Makromolekulare Chemie*, v. 21, no. 2, Nov. 1956, p. 77-105.

Compounds were used to initiate the polymerization of vinyl monomers.

3161* (German.) Investigation of Polystyrols of Various Preparations. **Untersuchungen an Polystyrolen verschiedener Herstellung.** W. Hahn, W. Müller, and R. V. Webber. *Makromolekulare Chemie*, v. 21, no. 2, Nov. 1956, p. 131-168.

Purified styrene was polymerized at temperatures from 0 to 132 C.

3162 New Thermoplastic for Tough Service Conditions. *Materials & Methods*, v. 44, Nov. 1956, p. 110-112.

Chlorinated polyether resin has chemical resistance akin to that of the fluorocarbons combined with good heat resistance, low water absorption, high dimensional stability, and good dielectric qualities.

3163 Elevated Temperature Properties of Reinforced Plastics. I. Katz and J. Goldberg. *Materials & Methods*, v. 44, Nov. 1956, p. 130-133.

Curves representing data assembled from many different sources are used to compare the performance of glass-reinforced phenolic, polyester, and silicone laminates at temperatures ranging from 300 to 1000 F.

3164 Mold Temperature Effects in Polyethylene Molding. Charles S. Imig. *Modern Plastics*, v. 34, Dec. 1956, p. 149 + 7 pages.

Greater strength and stiffness along with faster cycles were obtained at lower mold temperatures. Clarity was also improved. Surface gloss decreased at lower temperatures when using highly polished cavities.

3165 Vacuum Venting of Molds. George S. Bohannon. *Modern Plastics*, v. 34, Dec. 1956, p. 162-163.

In a new approach to trapped-air problems, a vacuum pump exhausts the mold cavities just prior to injection.

3166 Stereospecific Catalysis and Isotactic Polymers. H. Natta. *Modern Plastics*, v. 34, Dec. 1956, p. 169 + 10 pages.

Types of polymerization; stereoisomerisms in vinyl compounds and in polymers of conjugated olefins; mechanism of processes suitable for stereospecific catalysis; catalysts and catalytic processes.

3167 The Propagation of Stress Pulses in Viscoelastic Solids. H. Kolsky. *Philosophical Magazine*, v. 1, ser. 8, no. 8, Aug. 1956, p. 693-710.

Propagation of short mechanical pulses along rods of three polymers, polythene, polystyrene, and polymethylmethacrylate was investigated experimentally. Pulses were produced by the detonation of small quantities of explosive at one end of a rod.

3168 The Determination of Dynamic Moduli and Internal Friction of High Polymers From Creep Measurements. J. J. Benbow. *Physical Society, Proceedings,* v. 69, no. 441B, Sept. 1956, p. 885-892.

The use of Fourier analysis to transform creep measurements to dynamic quantities, with specific reference to some measurements made on polythene.

3169* Effect of Fillers in Polyethylene. W. J. Frissell. *Plastics Technology,* v. 2, Nov. 1956, p. 723-729, 746.

Test procedures and results; summary of properties obtained.

3170* Estimating Concentrations of Amine Curatives for Epoxy Resins. George Epstein. *Plastics Technology,* v. 2, Nov. 1956, p. 739-740.

A method for mathematically estimating the optimum amounts of amine-type curing agents for epoxy resins.

3171 Polyurethanes. A Versatile Synthetic for a Dynamic Era. Georges F. Doriot. 115 p. 1956. Polyurethane Associates, Cambridge, Mass. (TS1940 P76)

Reviews developments and progress which have already taken place and projects the market potential for polyurethanes.

See also: **1778** (amino acid copolymers); **1908** (short-wave spectroscopy of polymers); **2042** (crystallization of polymers); **2088** (kinetics of polymeric reactions); **2252** (resins for embedment of electronic units); **3228** (permeability of plastic film); **3238** (bonding of polystyrene foam); **3251** (bonding plastics to metal).

POLLUTION AND WASTES

3172 Air Pollution Handbook. Paul L. Magill, Francis R. Holden, and Charles Ackley, editors. Sections individually paged. 1956. McGraw-Hill, New York. (TD883 M27a)

The theoretical, technical, and practical aspects; discusses causes, effects, and controls covering the science of air pollution, the effects on plants and animals, and the various corrective techniques.

3173 Analysis of Industrial Wastes. *Analytical Chemistry,* v. 28, Dec. 1956, p. 1804-1838.

A symposium of papers dealing with: coulometry; atmospheric pollution; determination of NO, NO_2, SO_2; alkyl benzene sulfonates, and small amounts of chloride.

3174* Aerosol Production and Size Analysis With the Roller Separator. Arnold E. Reif, Clayton S. White, and Mary Elliott Giblin. *Archives of Industrial Health,* v. 14, Nov. 1956, p. 442-449.

Describes the operating characteristics of the Roller separator in the production of aerosols from dust samples, with special emphasis on aerosols under 10 μ in diameter.

3175* Some Properties of Unipolarly Charged Aerosols. V. Alexander Gordieyeff. *Archives of Industrial Health,* v. 14, Nov. 1956, p. 471-481.

Theories and experimental work on charged atmospheric particles and physiological effects on the body.

3176 Atmospheric Pollution, Its Origins and Prevention. A. R. Meetham. 2nd Rev. Ed. 302 p. 1956. Pergamon Press, New York. (TD884 M47a2)

Fuels and fuel-burning appliances; industrial furnaces; domestic fires; properties and measurement of atmospheric pollution; remedial measures.

3177 Gases Cleaned by the Use of Scrubbers. Bernard Basse. *Blast Furnace and Steel Plant,* v. 44, Nov. 1956, p. 1307-1310, 1312.

Description of equipment; operating procedures.

3178* (French.) A Study on River Pollution and Self Purification. An Investigating Method Applied to the Geer Case. **L'étude de la pollution d'une rivière et de son autoépuration. Application d'une méthode de recherche au cas du Geer.** Edm. Leclerc, P. Beaujean, and M. R. Heuse. *Centre Belge d'Etude et de Documentation des Eaux,* v. 3, no. 33, 1956, p. 142-153.

River pollution and self purification in relation to their various stages. Methods such as map studies, borings, and field examination; river slope, rate of flow, and temperature. Application to the Geer basin.

3179 The Determination of Toxic Substances in Air. N. Strafford, C. R. N. Strouts, and W. V. Stubbings, editors. 226 p. 1956. W. Heffer & Sons, Ltd., Cambridge, England. (RC963.5 St81d)

Apparatus and detailed methods for 49 toxic substances commonly encountered in industry.

3180* The New Look Urban Air Sanitation. Lauren B. Hitchcock. *Industrial Wastes,* v. 1, Nov.-Dec. 1956, p. 261-266.

An analysis of the problem and current progress in the field.

3181* Challenge to Research by Water and Air Pollution Problems. Raymond W. Hess. *Industrial Wastes,* v. 1, Nov.-Dec. 1956, p. 273-277.

Indicates areas where research is needed.

3182* Nuclear Reactor Wastes From Small Power Reactors. A. Louis Medin. *Industrial Wastes,* v. 1, Nov.-Dec. 1956, p. 278-281.

Types and sources of radioactive wastes produced from heterogeneous reactors employing light water coolants. An equation for calculation of the activation of impurities in the coolant. Methods for reducing the quantity of wastes. A disposal system.

3183 New Developments in Smoke Control at Cominco. R. Bainbridge. *Journal of Metals,* v. 8, Nov. 1956, p. 1536-1540.

Gas conditioning for dust recovery by electrostatic precipitation; gas cooling for baghouse operation; dust recovery from wet gas.

3184 Annotated Bibliography on Fall-Out Resulting From Nuclear Explosions. Allen G. Hoard, Merril Eisenbud, and John H. Harley. *New York Operations Office (U. S. Atomic Energy Commission),* NYO 4753, Sept. 1956, 44 p. (UF767 U3ny Contin.)

Lists published articles and speeches concerning the various aspects of radiation effects resulting from fallout.

3185* Metal Plating Wastes and Sewage Treatment. Donald Tarvin. *Sewage and Industrial Wastes,* v. 28, Nov. 1956, p. 1371-1391.

An investigation of the effects of several metals on biological sewage treatment.

3186* Blast Furnace Flue Dust Treatment Facilities. William H. Weise. *Sewage and Industrial Wastes,* v. 28, Nov. 1956, p. 1398-1402.

Plant facilities; blast furnace operation; gas cleaning system; water requirements; sludge recovery system.

3187* (German.) Investigation of Flow Process in Cyclones. **Untersuchungen über den Strömungsverlauf in Zyklonen.** E. Walter. *Staub,* 1956, no. 46, p. 466-480.

A conically widened out centrifugal chamber offers advantages over a cylindrical or conically narrowing type.

3188* (German.) New Dust-Measuring and Screening Device. **Ein neues Staubmess- und Sichtgerät.** E. Walter. *Staub,* 1956, no. 46, p. 481-488.

A further development of the cyclone probe.

3189 Sanitary Engineering Aspects of the Atomic Energy Industry. A. S. Goldin. *U. S. Atomic Energy Commission,* TID-7517, pt. 1B, Oct. 1956, p. 323-635. (UF 767 Un3ti Contin.)

Papers on radioactive waste disposal and public health problems.

See also: **1769** (radiation sterilization of sludge); **2354** (treatment of cannery wastes); **3219** (treatment of papermill wastes); **3220** (tannery waste disposal); **3221** (treatment of viscose-cellulose wastes).

RUBBER AND ELASTOMERS

3190* (French.) The Manufacture of Butyl Rubber. **La fabrication du caoutchouc butyl.** Maurice Moulin. *Chimie & Industrie*, v. 76, no. 4, Oct. 1956, p. 746-753.

Includes isolation of isobutylene from a cracking plant and production of isoprene by thermal cracking. Qualities of butyl rubber are differentiated mainly by their mol. wt. and degree of unsaturation.

3191* (Russian.) The Properties of Polyisoprene as Related to Its Microstructure. **Vliianie mikrostruktury poliizoprena na ego svoistva.** A. A. Korotkov, K. B. Piotrovskii, and D. P. Feringer. *Doklady Akademii Nauk SSSR*, v. 110, no. 1, Sept. Oct. 1956, p. 89-92.

Determination, with the aid of infra-red spectroscopy, of the joint content of 1,2 and 3,4 isoprene bonds in the polymer. Effect of 1,2 and 3,4 bond content on mechanical properties.

3192 Reinforcement of Synthetic Elastomers. *Industrial and Engineering Chemistry*, v. 48, Nov. 1956, p. 2080-2094.

Three papers dealing with mica fillers in vulcanized GR-S rubber; effect of carbon fillers in bonding butyl rubber to 70/30 brass; influence of particle size and type on tensile behavior.

3193* Cyclised Rubber. G. F. Bloomfield and S. C. Stokes. *Institution of the Rubber Industry, Transactions*, v. 32, Oct. 1956, p. 172-188.

The masterbatch blends with rubber in all proportions to produce vulcanizates of varying hardnesses. Good tensile properties are obtained with higher moduli than is usual with conventional white reinforcing fillers.

3194 The Use of Epoxy Resins in Synthetic Rubber Compositions. Thomas F. Mika. *Journal of Applied Chemistry*, v. 6, Sept. 1956, p. 365-375.

Intermediate thiol groups formed in the reaction of a nitrile rubber with S were found to co-react with epoxide resins. The resin acts as a reinforcing agent contributing improved solvent resistance and increased tear strength.

3195* Oxidation of Polybutadiene. I. Rate of Oxidation. II. Property Changes During Oxidation. Richard G. Bauman and Samuel H. Maron. *Journal of Polymer Science*, v. 22, Oct. 1956, p. 1-12; Nov. 1956, p. 203-212.

The oxidation rates were found to go through an induction period, to accelerate rapidly to a maximum, and then to decrease to low values. Presence of O causes both scission and crosslinking, with predominance of either of these processes being dependent on the amount of O absorbed.

3196* Ozonolytic Degradation of Interpolymers of Natural Rubber With Methyl Methacrylate and Styrene. D. Barnard. *Journal of Polymer Science*, v. 22, Nov. 1956, p. 213-216.

3197* Copolymerization of Methyl *trans*-β-Benzoylacrylate With Butadiene. C. S. Marvel and Ralph C. Farrar, Jr. *Journal of Polymer Science*, v. 22, Nov. 1956, p. 223-226.

3198* (Russian.) Investigation of Softeners Activating the Filler Action in Rubber Mixtures. **Issledovanie miagchitelei, aktiviziruiushchikh deistvie napolnitelei v rezinovykh smesiakh.** A. E. Segalevich. *Khimicheskaia Promyshlennost'*, 1956, no. 6, Sept. 1956, p. 13-18.

Studies to increase frost resistance. Comparisons of active rubber softeners of the asphalt-bitumen type forming colloidal structures with high physical-mechanical properties and neutral softeners acting as diluents.

3199* (Russian.) Reinforcement of Rubber in Latex. **Usilenie kauchuka v latekse.** B. A. Dogadkin, L. G. Senatorskaya, V. I. Guseva, A. V. Susliakov, and P. I. Zakharchenko. *Kolloidnyi Zhurnal*, v. 18, no. 5, Sept.-Oct. 1956, p. 528-535 + 1 plate.

Reinforcing rubber by direct addition of the fillers to the latex has resulted in stronger but slower curing vulcanizates.

3200* (Russian.) On the Laws Governing the Development of the High-Elastic Shear and the Relaxation of Stress in Elastomers and Their Solutions. **O zakonomernostiakh razvitiia deformatsii sdviga i relaksatsii napriazheniia v elastomerakh i ikh rastvorakh.** L. V. Ivanova-Tschumakova and P. A. Rebinder. *Kolloidnyi Zhurnal*, v. 18, no. 5, Sept.-Oct. 1956, p. 540-546.

3201 Rubber in Electronics. L. K. Braunston and J. C. Montermoso. *Military Electronics*, v. 1, Nov. 1956, p. 14-17.

A selection guide to types, characteristics, and properties of rubber as they apply to electronic design of military equipment.

3202* (German.) Foam Materials Based on Rubber Production, Testing, and Application of Foam Rubber. **Schaumstoffe auf Kautschukbasis Herstellung, Prüfung und Verwendung von Gummi mit zelliger Struktur.** G. Saffran. *Plaste und Kautschuk*, v. 3, no. 10, Oct. 1956, p. 226-228.

Gives the fundamentals of raw materials and machinery used in foam rubber manufacturing. (To be continued.)

3203* (Japanese.) **Studies on Silicon Rubber. IV. Effects of Polysiloxane and Fillers on the Properties of Silicone Rubber Obtained.** Tsunao Araki and Kiyoshi Ohsuga. *Reports of the Government Chemical Industrial Research Institute, Tokyo*, v. 51, no. 10, Oct. 1956, p. 364-372.

Effects of polysiloxane and fillers on the properties of silicone rubber obtained.

3204 Properties of Silicone Modified Rubbers. Ellis H. Phreaner. *Rubber Age*, v. 80, Nov. 1956, p. 255-269.

The theory of silicone modification, the nature and stability of an oriented "silicone bridge" between filler particles and organic materials, and the qualities that can be expected of products of these inter-molecular and inter-surface phenomena.

3205 The Reaction of Molecular Oxygen With Rubber. E. M. Bevilacqua. *Rubber Age*, v. 80, Nov. 1956, p. 271-277.

Crosslinks and interlink chains; properties of crosslinked networks.

3206 Latest Developments in Mechanical Rubber Goods. *Rubber Age*, v. 80, Nov. 1956, p. 278-292.

A symposium dealing with rubber belting, hose, expanded rubber, small molded goods, reinforcing pigments, and machinery and equipment.

3207* A Zinc Oxide Viscosity Test for *Hevea* Latex. H. G. Dawson. *Rubber World*, v. 135, Nov. 1956, p. 239-244.

The ZOV test is simple, rapid, sensitive, and reproducible and has been valuable in studying the effects of aging at various temperatures, ammonia concentration, preservative, and variations in serum solids.

3208* Degree of Cure in Filler-Reinforced Vulcanizates by the Swelling Method. II. Gerard Kraus. *Rubber World*, v. 135, Nov. 1956, p. 254-260.

Increase in degree of cure on aging; acceleration; oil extended rubbers; carbon black type; silica-loaded stocks; *Hevea* and butyl rubbers; special vulcanization systems.

See also: **3136** (photoelastic properties of rubber); **3244** (rubber to metal bonds).

SPACE HEATING AND CONDITIONING

3209* What Every Refrigeration Contractor Should Know About Refrigeration Piping. John P. Johnston. *Commercial Refrigeration & Air Conditioning*, v. 13, Dec. 1956, p. 40-47.

Includes all the tables, charts, equations, and other figures necessary to properly size refrigeration piping for any normal-temperature systems.

3210* Space Heating With the Atom. S. L. Nelson. *General Electric Review*, v. 59, Nov. 1956, p. 35-37.

Wasted heat; design for recovery; heating system; back-up system; radioactivity problems; space heating a building.

3211* (Swedish.) Foundry Ventilation and Shakeout. **Ventilation vid uppslagning.** G. Carlberg. *Gjuteriet*, v. 46, no. 10, Oct. 1956, p. 133-135.

A study of foundry ventilation during the shakeout process, with and without mechanical devices; special attention was given to the suction of dangerous dust through the grid and above floor level, to fumes during cooling, and to suction ducts and dust extractors.

3212* (Swedish.) Foundry Ventilation During Fettling. **Ventilation vid rensning.** E. Krantz. *Gjuteriet*, v. 46, no. 10, Oct. 1956, p. 135-138.

A study of removal of silica and quartz dust for the protection of the personnel during centrifuging, short peening, machine chipping, and grinding.

3213 What Factors Affect Evaporator Performance Characteristics? W. C. Dackis. *Heating, Piping & Air Conditioning*, v. 28, Nov. 1956, p. 130-133.

Engineering analysis with respect to air flow, surface area, pressure drop, and other variables in refrigeration system design.

3214 Performance of Covered Hot Water Floor Panels. II. Room Conditions. E. L. Sartain and W. S. Harris. *Heating, Piping & Air Conditioning*, v. 28, Nov. 1956, p. 143-150.

Studies included consideration of room-air temperature and velocity; slab, floor covering, wall, glass, and ceiling surface temperatures; heat flow from panel to room; relative humidity produced in the test rooms.

3215 How Cycling Rate Affects Humidity Control. J. E. Janssen and P. E. McNall. *Refrigerating Engineering*, v. 64, Nov. 1956, p. 37-40, 101-102.

Theoretical analysis.

See also: 2253 (cooling of electronic equipment); **2413** (mechanical refrigeration principles).

TEXTILES, FIBERS, LEATHER, AND PAPER

3216* (English.) **Dyeing of Wool With Lichens and Lichen Substances.** Yngve Johannes Solberg. *Acta Chemica Scandinavica*, v. 10, no. 7, 1956, p. 1116-1123.

Suggests that the formation of azomethine linkages is responsible for the yellow color obtained under mild dyeing conditions with aldehydic substances. Preparation of some new azomethine compounds with fumarprotocetraric and salazinic acids.

3217* (English.) **Dimethylsulphoxide, a Solvent for Hemicelluloses.** Erik Hägglund, Bengt Lindberg, and John McPherson. *Acta Chemica Scandinavica*, v. 10, no. 7, 1956, p. 1160-1164.

Part of the holocellulose of birch or spruce can be extracted with dimethylsulphoxide and further quantities are extracted from the swollen material by a subsequent treatment with water. Dimethylsulphoxide can also be used as a rather selective precipitating agent.

3218* A Study of the Scorching Characteristics of Fabrics. *American Dyestuff Reporter*, v. 45, Nov. 19, 1956, p. 845P-856P.

Scorching is more dependent on the chemical nature of the fiber or finishing treatment than on the physical form of the fiber or fabric.

3219* Design Factors for Primary Treatment of Pulp and Paper Mill Waste. Anthony J. Palladino. *Industrial Wastes*, v. 1, Nov.-Dec. 1956, p. 267-270.

Considers conventional plain sedimentation units equipped with sludge removal mechanisms.

3220* Tannery Waste Disposal by Spray Irrigation. J. F. Eick. *Industrial Wastes*, v. 1, Nov.-Dec. 1956, p. 271-272.

3221* The Treatment of Gaseous and Liquid Effluents Attendant in Producing Viscose Cellulose Film. C. B. Roberts and H. T. Farrar. *Industrial Wastes*, v. 1, Nov.-Dec. 1956, p. 282-287.

3222 Paper and Pulp Mill Catalogue Engineering Handbook. 1956-1957. 559 p. Fritz Publications, Chicago. (TS1205 P1933d Over.)

Indexes of equipment, materials, pulp and paper making chemicals, and trade names; directory of schools giving courses in pulp and paper manufacture; general engineering data.

3223* (English.) **Electron Microscopic Investigation of the Formation of Fibrillar Structures From Viscose.** Olof Samuelson, Folke Alvång, and Åke Svensson. *Svensk Papperstidning*, v. 59, no. 20, Oct. 1956, p. 712-715.

Cellulose acetate was dissolved as a molecular dispersion in acetone to a dilute solution. Saponified, and converted to viscose, it behaves like normal viscose.

3224* Studies of Penetration and Diffusion Into Wood. J. E. Stone and Carl Förderreuther. *Tappi*, v. 39, Oct. 1956, p. 679-683.

The rates at which Na and ammonium sulfites move into aspen sapwood were compared under conditions approximating commercial practice.

3225* Surface Chemical Studies on Pitch. I. A New Approach to the Pitch Problem in Papermaking. John W. Swanson and R. H. Cordingley. *Tappi*, v. 39, Oct. 1956, p. 684-690.

Most wood pulps suspended in aqueous media rapidly form an adsorbed film at the water-air interface. Effects of film composition, temperature, pH, ionic concentration in the substrate, and film pressure upon the deposition and adhesion of the film to solid surfaces.

3226* Shrinkage of Waste Paper During Deinking. J. J. Forsythe. *Tappi*, v. 39, Oct. 1956, p. 719-722.

Effects of composition of the waste paper itself, losses due to mechanical treatments, and losses due to chemical treatments.

3227* Effect of Dow Latex 512-R on the Rheological Properties of Casein, Alpha Protein, and Starch-Bound Clay Coatings. R. G. Jahn. *Tappi*, v. 39, Oct. 1956, p. 725-735.

Latex contributes beneficially to rheological properties of coating.

3228* Studies in the Gas and Vapor Permeability of Plastic Films and Coated Papers. I. Determination of the Permeability Constant. II. Some Factors Affecting the Permeability Constants. C. Rogers, J. A. Mayer, V. Stannett, and M. Szwarc. *Tappi*, v. 39, Nov. 1956, p. 737-747.

3229* Neutral Sulphite Semichemical Pulping. I. A Kinetic Study of the Reactions. Marshall E. Findley and W. J. Nolan. *Tappi*, v. 39, Nov. 1956, p. 758-768.

Effects of temperature, concentration, and time on the pulping of red maple.

3230* Alkali Solubility of Alkali-Cellulose. I. Solubility Changes in the Production and Air-Aging of Alkali-Cellulose From Beech Sulphite Pulps. II. Cold Alkali Extraction of Commercial Alkali-Cellulose. III. Regeneration of Used, Hemicellulose-Containing Liquors From the Cold Alkali Extraction of Alkali-Celluloses. Theodor N. Kleinert and Philipp Wurm. *Tappi*, v. 39, Nov. 1956, p. 807-819.

3231* A Comparison of Bleaching Agents for Sulphate Pulp. R. L. Miller, R. A. Dando, and R. P. Hamilton. *Tappi*, v. 39, Nov. 1956, p. 826-829.

Chlorine dioxide and peroxide are competitive in their ability to produce brightness in the 88 to 90 range, particularly when the aging properties are taken into account.

3232 (German.) Technology of Dyeing and Textile Refinement. **Technologie der Färberei und Textilveredlung.** Albert Schaeffer. 808 p. 1954. Melliand, Heidelberg. (TP897 Sch13t)

Natural and synthetic fibrous materials; dyes and dyeing processes; machinery.

3233 Effect of Humidity on the Tensile Behavior of Grey, Scoured, Mercerised and Chemically Modified Cotton. R. Meredith. *Textile Institute, Journal (Transactions)*, v. 47, Oct. 1956, p. 499T-510T.

Load-extension curves of a folded cotton yarn, which was scoured or mercerized and then tendered to various degrees by oxidation, acid, or heat was determined at relative humidities ranging from 9 to 100%.

3234 Periodate Oxidation of Water-Soluble Methylcellulose and Its Constituent Methylglucoses. G. C. Gibbons. *Textile Institute, Journal (Transactions)*, v. 47, Oct. 1956, p. 511T-529T.

Rate of over-oxidation relative to the glycol reaction is increased by dilution of the reaction system and decreased by raising the proportion of methylcellulose to periodate. Over-oxidation is inhibited by acetic, butyric, and phthalic acids.

3235* Water Transport Mechanisms in Textile Materials. I. The Role of Yarn Roughness in Capillary-Type Penetration. Norman R. S. Hollies, Martha M. Kaessinger, and Herman Bogaty. *Textile Research Journal*, v. 26, Nov. 1956, p. 829-835.

Effective advancing contact angle of water on the yarn increases with yarn roughness. Continuity of capillaries formed by the yarn fibers to decreases as fiber arrangement becomes more random.

3236* The Application of Crease-Resistant Finishes to Cotton. A. R. Smith. *Textile Research Journal*, v. 26, Nov. 1956, p. 836-851.

Drop in tensile or tear strengths resulting from a crease-resisting treatment of cotton is directly proportional to the crease resistance imparted, regardless of the type of precondensate applied.

3237* Polyvinyl Alcohol as a Warp Size for Various Staple Yarns. Edward Abrams, Charles W. Rougeux, and James N. Coker. *Textile Research Journal*, v. 26, Nov. 1956, p. 875-880.

Effective as an extender for various sizes based on starch or modified starch; size formulations tested.

See also: **3129** (production of acrylonitrile fibers); **3140** (synthetic fibers).

WELDING AND JOINING

3238* Adhesive Bonding of Polystyrene Foam for Naval Service. H. J. Stark and M. Glickman. *American Society of Naval Engineers*, v. 68, Nov. 1956, p. 739-743.

Of those adhesives comprising the drying type tested, the polyvinyl acetate compositions yielded superior values under all conditions of test.

3239* Porosity in Nickel Welded by the Argon-Arc Process. D. R. Milner. *British Welding Journal*, v. 3, Nov. 1956, p. 542-545.

Argon gave adequate protection of the upper surface of the weld, but O pick-up occurred at the underside. Hydrogen introduced with the A resulted in elimination of porosity.

3240 Some Problems of the Metallurgy of Semi-Automatic Welding of Stainless Steel Using Unfused Siliceous Fluxes. A. I. Akulov. *Henry Brutcher Translation No.* 3794, 8 p. (From *Avtomaticheskaya Svarka*, v. 8, no. 3, 1955, p. 50-54.) Henry Brutcher, Altadena, Calif.

Introduction of ferrosilicon into flux. Results obtained with unfused fluxes in the welding of Ti stabilized stainless steels.

3241* Constant Arc Length vs. Constant Arc Voltage. Roger W. Tuthill. *Industry & Welding*, v. 29, Dec. 1956, p. 54-56, 59, 86.

Arc length controls quality and appearance of weld. Arc voltage is convenient tool for measuring arc length.

3242* Use Multiple-Pass Welding Techniques to Join Nickel Alloy Components. *Industry & Welding*, v. 29, Dec. 1956, p. 78-80, 82-83.

Inert-gas-shielded-arc welding with small diameter welding rod and multiple passes produces extremely sound and highly uniform welds required for atomic energy machinery components.

3243 The Removal of Oxide From Aluminium by Brazing Fluxes. M. F. Jordan and D. R. Milner. *Institute of Metals, Journal*, v. 85, Oct. 1956, p. 33-40 + 1 plate.

Studies carried out by the interference-fringe technique confirmed that the oxide films are not dissolved, but are detached from the surface by the flux. The film is undetermined as a result of electrochemical action at the oxide-metal interface, a cell being set up between the oxide and metal.

3244* Evaluation of Rubber to Metal Bonds. J. M. Buist, T. J. Meyrick, and R. L. Stafford. *Institution of the Rubber Industry, Transactions*, v. 32, Oct. 1956, p. 149-167.

Evaluation of bonds prepared by both compression and transfer molding and tested by a variety of static and dynamic tests.

3245 Take Six Steps to Better Brazing. *Iron Age*, v. 178, Nov. 29, 1956, p. 80-81.

Joint clearance limits brazing alloy flow; flux brushes on more quickly, spreads more uniformly and produces better fluxing action if warmed to about 90 to 100 F; the brazing alloy flows best if joint is uniformly heated.

3246* (Russian.) Welding of Austenitic Steel Rotors. **Svarka rotorov iz austenitnoi stali.** K. V. Liubavskii and V. A. Toropov. *Metallovedenie i Obrabotka Metallov*, 1956, no. 10, Oct. 1956, p. 52-56.

A study of the conditions of arc welding of rotors consisting of a few discs and two austenitic steel ends. A process was devised for welding and thermal treatment of commercial rotors.

3247 16-8-2 Cr-Ni-Mo for Welding Electrode. O. R. Carpenter and R. D. Wylie. *Metal Progress*, v. 70, Nov. 1956, p. 65-73.

Difficulties cropping up with welded stainless equipment in high-temperature service have led to a new composition which is free from weld cracks and is superior to the usual Type 347 electrode in all respects except resistance to intergranular corrosion.

3248* Titanium Alloys Arc-Welded in Open Air. Ben C. Brosheer. *Metalworking Production*, v. 100, Nov. 9, 1956, p. 1819-1822.

Fusion welding of Ti alloys in the open air is practical and economical with automatic inert-gas shielded W arc. Manual welding with the same arc also looks promising, but requires a very high level of "operator integrity".

3249 Climbing Peel Test for Strength of Adhesive Bonds. Fred Werren and H. W. Eickner. *Modern Plastics*, v. 34, Dec. 1956, p. 187-188, 190, 264.

Apparatus is applied to the testing of aircraft sandwich materials with thin facings.

3250 Observations on Weak Laps in Tinplate Can Bodies. W. E. Hoare and J. P. Gustin. 12 p. 1954. Tin Research Institute, Greenford, England. (TS590 T49o)

Satisfactory seam strength depends ultimately on design of the seam, control of can-fabricating operations so that designed dimensions are maintained, use of proper conditions in soldering, and use of tinplate of good soldering quality.

3251 Some New Aspects of Polymer-to-Metal Bonding. Norman Stuart. *Plastics*, v. 21, Nov. 1956, p. 308-311, 313.

The study of bonding films by interference microscopy. A report on some of the work at present in progress.

3252* Modern Adhesives. II. The Formulation of Glues and Other Adhesives. F. N. Reckless. *Soap, Perfumery and Cosmetics*, v. 29, Nov. 1956, p. 1249-1252.

Animal glue formulations; fish glue; casein and other protein glues; vegetable adhesives; starch adhesives. (To be continued.)

3253 The Weldability of High-Tensile Structural Steels. C. L. M. Cottrell, K. Winterton, and B. J. Bradstreet. Reprint of Ministry of Supply Report; W. R. (D) Jan. 1955. 102 p. 1956. British Welding Research Assn., London. (TS227 C82w)

Concerns the problem of cold cracking the heat-affected zone of welds made in low-alloy structural steels.

3254 Filler Metals for Joining. Orville T. Barnett. *Welding Engineer*, v. 41, Dec. 1956, p. 54, 56, 59-60.

Advantages of iron powder electrodes include improved deposition rates, high strength, readily controllable slag, good mechanical properties of deposited weld metal, and decreased costs.

3255 Some Nondestructive Testing Methods for Testing Welds. W. J. McGonnagle. *Welding Journal*, v. 35, Nov. 1956, p. 1110-1119.

The sensitivity, advantages, disadvantages, and limitations of various methods and techniques of nondestructive testing.

3256 Multipower Submerged-Arc Welding of Pressure Vessels and Pipe. R. A. Kubli and H. I. Shrubsall. *Welding Journal*, v. 35, Nov. 1956, p. 1128-1135.

Advantages of high-welding speeds and high deposition rates make technique attractive where larger amounts of repetitive welding are involved. Scott connection provides simplest ap-

paratus and control system while retaining most advantages of the three-phase method.

3257 Measurement and Calculation of Ferrite in Stainless-Steel Weld Metal. W. T. DeLong, G. A. Ostrom, and E. R. Szumachowski. *Welding Journal*, v. 35, Nov. 1956, p. 521S-528S.

Magne gage is a useful and reliable instrument for measurement of ferrite if properly used on as-welded specimens. New constitution diagram for stainless-steel weld metal.

3258 Development of a Ferritic-Austenitic Weld Joint for Steam Plant Application. J. T. Tucker, Jr. and F. Eberle. *Welding Journal*, v. 35, Nov. 1956, p. 529S-540S.

Apparent solution to the cracking of ferritic-austenitic welded joints found in certain protective weld features and in the use of the proper type of austenitic electrodes.

3259 Isothermal Studies on the Weld-Metal Microcracking of Arc Welds in Mild Steel. A. E. Flanigan and Z. P. Saperstein. *Welding Journal*, v. 35, Nov. 1956, p. 541S-556S.

Temperature-dependence of time required to achieve isothermal immunization against weld-metal microcracking and reasonableness of the H retained austenite hypothesis.

3260* (Czech.) The Theory of Pressure Welding. **Theorie tlakového svařování.** F. Erdmann-Jesnitzer. *Zváranie*, v. 5, nos. 8-9, Sept. 1956, p. 228-233.

The development of a theory of pressure welding which takes into consideration the most important factors of heat, time, pressure, and elastic and plastic deformation. Theory agrees well with practice.

3261* (Czech.) Welding With Completely Coated, Completely Consumed Electrodes. **Svarování celobalenými elektrodami bez nedopalku.** Vilém Hromádko. *Zvaranie*, v. 5, nos. 8-9, Sept. 1956, p. 236-243.

Welding with completely coated electrodes of the type E44.72. The electrodes are lightly welded to the holder and are completely consumed. Discussion of advantages and disadvantages.

See also: **2425** (welding documentation); **2512** (welding in production); **2536** (bonding of sandwich panels); **2771** (fatigue of welds); **2773** (fatigue of structural welds); **2812** (strength of adhesive-bonded Al joints); **2813** (fatigue strength of riveted Al).

MISCELLANEOUS

3262* The Conjugate Coordinate System for Plane Euclidean Geometry. Walter B. Carver. *American Mathematical Monthly*, v. 63, Nov. 1956, 86 p.

An elementary exposition of a method of handling certain types of problems in plane Euclidean geometry.

3263 Annual Report of the Board of Regents of the Smithsonian Institute. 537 p. 1955. United States Government Printing Office, Washington, D. C. (Q11 Sm69 Vis.)

Papers on nuclear power, solar activity, aeronautics, transatlantic telephone cable, mechanical heart, and viruses.

3264* (French.) Fundamental Aspects of Industrial Research. **Les aspects fondamentaux de la recherche industrielle.** L. Roosens. *Chimie & Industrie*, v. 76, no. 4, Oct. 1956, p. 836-847.

Research expenses of several large enterprises are revealed and some economic aspects are mentioned.

3265 The Ford Foundation and Foundation Supported Activities in India. 106 p. 1955. Ford Foundation, New York. (HC435 F75f)

A summary of the organization's origins, objectives, and internal activities, mainly those to which it has contributed in India.

3266 Functional Analysis. Frigyes Riesz and Béla Sz.-Nagy. (Translated from the French by Leo F. Boron.) 468 p. 1955. Frederick Ungar Publishing Co., New York. (QA300 R441tr)

Modern theories of differentiation and integration; integral equations; linear functions and transformations.

3267 Irrational Numbers. Ivan Niven. **Carus Mathematical Monographs. No. XI.** 164 p. 1956. Mathematical Assn., of America, Buffalo. (QA247.5 N64i)

A monograph with main emphasis on those aspects of irrational numbers commonly associated with number theory and Diophantine approximations.

3268 Basic Concepts of Space Law. Andrew G. Haley. *Jet Propulsion*, v. 26, Nov. 1956, p. 951-957, 968.

Development of the international law controlling activities in the air spaces above the earth; system based on the principle of fundamental justice; steps in the field of communications.

3269 (French.) Lebanon. **Le Liban.** Étienne de Vaumas. 367 p. 1954. Firmin-Didot, Paris. (GB289.L4 V46L Over.)

A study of the physical geography of Lebanon, including geologic structure, climate, hydrography, and vegetation.

3270 Explosions of Titanium and Fuming Nitric Acid Mixtures. L. L. Gilbert and C. W. Funk. *Metal Progress*, v. 70, Nov. 1956, p. 93-96.

The probability of a pyrophoric reaction depends upon the amount of water and NO_2 in the acid.

3271* A General Theory of Linear Prediction and Filtering. Julius Bendat. *Society for Industrial and Applied Mathematics, Journal*, v. 4, Sept. 1956, p. 131-151.

3272 Technical Education Its Aims, Organisation and Future Development. P. F. R. Venables. 645 p. 1956. G. Bell and Sons, Ltd., London. (T66 V55t)

The present scope of technical education in Great Britain; problems and opportunities; character and range of institutions; courses offered; buildings and equipment; relationship with industry; administration.

3273 Topics in Number Theory. William Judson LeVeque. v. I-II. 198 and 270 p. 1956. Addison-Wesley Publishing Co., Reading, Mass. (QA241 L57t)

An introduction to some of the important techniques and results of classical and modern number theory.

3274 Crash Injury. Gerard J. Pesman and Martin Eiband. *U. S. National Advisory Committee for Aeronautics, Technical Note* 3775, Nov. 1956, 36 p. (TL570 Un3t)

Hazards studied were: being crushed, being struck by missiles, striking objects by tearing loose or flailing about, and being injured by the crash decelerations.

See also: **2180** (root locus method for system analysis); **2378** (vector operations on two-dimensional orientation varites).